3/-

The University Library
Leeds

Medical and Dental
Library

30106 004084926

University of Leeds Medical and Dental Library
DATE DUE FOR RETURN

-3 DEC 1986 CANCEL		

UPS/4442/5/82

Stack
QV 4
GAR
STORE L34

THE

ESSENTIALS

OF

MATERIA MEDICA

AND

THERAPEUTICS.

16— 3 —

Not for Circulation.

LEEDS SCHOOL OF MEDICINE

THE ESSENTIALS OF MATERIA MEDICA AND THERAPEUTICS.

BY

ALFRED BARING GARROD, M.D., F.R.S.,

Fellow of the Royal College of Physicians; Consulting Physician to King's College Hospital late Professor of Materia Medica and Therapeutics at King's College, and Examiner in Materia Medica at the University of London.

TWELFTH EDITION.

REVISED AND EDITED UNDER THE SUPERVISION OF THE AUTHOR,

By NESTOR TIRARD, M.D. Lond.,

Fellow of the Royal College of Physicians; Fellow of King's College, London; Professor of Materia Medica and Therapeutics at King's College; Assistant Physician to King's College Hospital; Physician to the Evelina Hospital for Sick Children; and Examiner in Materia Medica at the Royal College of Physicians.

LONDON:
LONGMANS, GREEN, AND CO.
1886.

LONDON:
BRADBURY, AGNEW, & CO., PRINTERS, WHITEFRIARS.

UNIVERSITY OF LEEDS
MEDICAL LIBRARY.

604526

PREFACE.

The continued popularity of the present Work affords sufficient proof that it supplies a real want, I have endeavoured to render it more worthy of the acceptance of practitioners and students of medicine, without in any way altering its character or adding sensibly to its bulk.

Though much new material has been introduced into the present edition to bring it into accordance with the "British Pharmacopœia" of 1885, yet space has been gained by numerous excisions of articles on drugs no longer employed, and by the alteration of type for the official preparations; and the value of the book as a student's text-book has in this way been considerably enhanced. The chemistry has been revised throughout, and many articles have been enlarged and rewritten. The sections on Therapeutics and Mineral Waters have been re-arranged and partially re-written, in order that they should contain the most recent information on these subjects.

Much of the valuable work of the editor of the last edition, the late Dr. Baxter, has been retained, and I take this opportunity of expressing my deep regret at the loss of so esteemed a coadjutor.

The task of re-editing the book has been mainly entrusted to my friend and former pupil, Dr. Tirard, who has devoted much time to the study of the therapeutic action and chemical properties of many important medicines, and upon whose ability and accuracy I can fully rely.

A. B. GARROD.

10, HARLEY STREET,
CAVENDISH SQUARE, W.
October, 1885.

LEEDS SCHOOL OF MEDICINE

TABLE OF CONTENTS.

PAGE
Articles included in the Pharmacopœia of 1885, but not in that of 1867, nor in the "Additions" of 1874 xxxi
Articles included in the Pharmacopœia of 1867, or in the "Additions" of 1874, but omitted in that of 1885 . . . xxxii
Articles and Preparations the names of which have been altered xxxiii
Substitutions xxxv
Preparations, the Composition of which has been altered . . xxxv
The Strengths of Preparations altered in the Pharmacopœia of 1885 xxxv

INTRODUCTION.

On the Weights and Measures of the British Pharmacopœia . . 1
Observations on Groups of Pharmacopœia Preparations . . . 3
General Pharmaceutical Directions 12
Table of Symbols and Equivalents 13

INORGANIC SUBSTANCES.

Oxygen 14
Nitrogen 14
Hydrogen 15
Carbon 15
Carbo Ligni 15
  Cataplasma Carbonis 15
Carbo Animalis 16
Carbo Animalis Purificatus 16
Sulphur 17
Sulphur Sublimatum 17
Sulphur Præcipitatum 17
  Confectio Sulphuris (*sublimed*) 18
  Unguentum Sulphuris (*sublimed*) 18
Phosphorus 19
  Oleum Phosphoratum 19
  Pilula Phosphori 20
Iodine 21
  Linimentum Iodi 21
  Liquor Iodi 21
  Tinctura Iodi 21
  Unguentum Iodi 21
  Vapor Iodi 21

PAGE
Sulphuris Iodidum . . . 23
Unguentum Sulphuris Iodidi . . . 23
Bromine . . . 24
Chlorine . . . 26
Liquor Chlori . . . 27
Vapor Chlori . . . 27
Water . . . 28
Aqua Destillata . . . 28
Acids . . . 29
Acidum Aceticum . . . 29
Acidum Aceticum Dilutum . . . 29
Oxymel . . . 30
Acidum Aceticum Glaciale . . . 30
Acetum . . . 31
Acidum Boricum . . . 31
Unguentum Acidi Borici . . . 32
Acidum Carbonicum . . . 32
Acidum Chromicum . . . 33
Liquor Acidi Chromici . . . 33
Acidum Citricum . . . 33
Acidum Hydrobromicum Dilutum . . . 34
Acidum Hydrochloricum . . . 35
Acidum Hydrochloricum Dilutum . . . 36
Acidum Hydrocyanicum Dilutum . . . 36
Vapor Acidi Hydrocyanici . . . 37
Acidum Lacticum . . . 39
Acidum Lacticum Dilutum . . . 39
Acidum Nitricum . . . 40
Acidum Nitricum Dilutum . . . 40
Acidum Nitro-Hydrochloricum Dilutum . . . 40
Acidum Phosphoricum Concentratum . . . 41
Acidum Phosphoricum Dilutum . . . 42
Acidum Sulphuricum . . . 43
Acidum Sulphuricum Aromaticum . . . 43
Acidum Sulphuricum Dilutum . . . 43
Acidum Sulphurosum . . . 44
Acidum Tartaricum . . . 45
Ammonium and its Salts . . . 46
Liquor Ammoniæ Fortior . . . 46
Liquor Ammoniæ . . . 47
Linimentum Ammoniæ . . . 47
Ammonii Carbonas . . . 48
Spiritus Ammoniæ Aromaticus . . . 48
Ammonii Chloridum . . . 49
Ammonii Bromidum . . . 50
Liquor Ammonii Acetatis Fortior . . . 50
Liquor Ammonii Acetatis . . . 51
Liquor Ammonii Citratis Fortior . . . 51
Liquor Ammonii Citratis . . . 51
Sulphydrate of Ammonium . . . 52
Ammonii Nitras . . . 52
Ammonii Phosphas . . . 52
Iodide of Ammonium . . . 53

PAGE
Aluminium 53
Alumen 53
Alumen Exsiccatum 54
Glycerinum Aluminis 54
Antimonium (Antimony) 55
Antimonium Nigrum Purificatum 55
Antimonium Sulphuratum 55
Antimonium Tartaratum 56
Vinum Antimoniale 57
Unguentum Antimonii Tartarati 57
Antimonii Oxidum 58
Pulvis Antimonialis 58
Liquor Antimonii Chloridi 59
Argentum (Silver) 59
Argentum Purificatum 59
Argenti Nitras 60
Argenti et Potassii Nitras 60
Argenti Oxidum 61
Arsenicum (Arsenic) 62
Acidum Arseniosum 62
Liquor Arsenicalis 63
Liquor Arsenici Hydrochloricus 65
Sodii Arsenias 65
Liquor Sodii Arseniatis 66
Arsenii Iodidum 66
Liquor Arsenii et Hydrargyri Iodidi 67
Bismuthum (Bismuth) 67
Bismuthum Purificatum 68
Bismuthi Oxidum 68
Bismuthi Subnitras 68
Trochisci Bismuthi 69
Bismuthi Citras 70
Liquor Bismuthi et Ammonii Citratis 70
Bismuthi et Ammonii Citras 70
Bismuthi Carbonas 71
Cadmium 71
Cadmii Iodidum 71
Unguentum Cadmii Iodidi 72
Sulphate of Cadmium 72
Calcium 72
Calx 72
Calcii Hydras 73
Liquor Calcis 73
Liquor Calcis Saccharatus 73
Linimentum Calcis 73
Calcii Carbonas Præcipitata 74
Marmor Album 74
Creta 74
Creta Præparata 74
Mistura Cretæ 74
Pulvis Cretæ Aromaticus 74
Pulvis Cretæ Aromaticus cum Opio 74
Calcii Chloridum 75
Liquor Calcii Chloridi 75

PAGE
Calx Chlorinata
Liquor Calcis Chlorinatæ . . . 75
Vapor Chlori . . . 76
Calcii Sulphas . . . 76
Calx Sulphurata . . . 76
Calcii Phosphas . . . 76
Calcii Hypophosphis . . . 77
Cerium . . . 77
Cerii Oxalas . . . 78
Cuprum (Copper) . . . 78
Cupri Sulphas . . . 79
Cupri Nitras . . . 79
Subacetate of Copper (Verdigris) . . . 80
Ferrum (Iron) . . . 80
Misturi Ferri Aromatica . . . 81
Vinum Ferri . . . 81
Ferrum Redactum . . . 81
Trochisci Ferri Redacti . . . 83
Ferri Carbonas Saccharata . . . 83
Mistura Ferri Composita . . . 84
Pilula Ferri Carbonatis . . . 84
Ferri Iodidum . . . 84
Syrupus Ferri Iodidi . . . 85
Pilula Ferri Iodidi . . . 85
Ferri Sulphas . . . 85
Ferri Sulphas Exsiccata . . . 86
Ferri Sulphas Granulata . . . 86
Ferri Arsenias . . . 86
Ferri Phosphas . . . 87
Syrupus Ferri Phosphatis . . . 88
Ferri Peroxidum Hydratum . . . 89
Emplastrum Ferri . . . 89
Liquor Ferri Dialysatus . . . 89
Liquor Ferri Perchloridi Fortior . . . 90
Liquor Ferri Perchloridi . . . 90
Tinctura Ferri Perchloridi . . . 90
Liquor Ferri Pernitratis . . . 91
Liquor Ferri Persulphatis . . . 91
Ferri et Ammonii Citras . . . 91
Vinum Ferri Citratis . . . 92
Ferrum Tartaratum . . . 92
Ferri et Quininæ Citras . . . 93
Liquor Ferri Acetatis Fortior . . . 93
Liquor Ferri Acetatis . . . 94
Tinctura Ferri Acetatis . . . 94
Hydrargyrum (Mercury) . . . 94
Hydrargyrum cum Cretâ . . . 95
Pilula Hydrargyri . . . 95
Emplastrum Hydrargyri . . . 95
Emplastrum Ammoniaci cum Hydrargyro . . . 95
Unguentum Hydrargyri . . . 96
Unguentum Hydrargyri Compositum . . . 96
Linimentum Hydrargyri . . . 96
Suppositoria Hydrargyri . . . 96
. . . 96

PAGE
Hydrargyri Subchloridum 100
Lotio Hydrargyri Nigra 100
Pilula Hydrargyri Subchloridi Composita 100
Unguentum Hydrargyri Subchloridi 100
Hydrargyri Perchloridum 101
Liquor Hydrargyri Perchloridi 102
Lotio Hydrargyri Flava 102
Hydrargyrum Ammoniatum 102
Unguentum Hydrargyri Ammoniati 103
Hydrargyri Iodidum Rubrum 103
Unguentum Hydrargyri Iodidi Rubri 104
Hydrargyri Oxidum Flavum 104
Oleatum Hydrargyri 104
Hydrargyri Oxidum Rubrum 105
Unguentum Hydrargyri Oxidi Rubri 105
Liquor Hydrargyri Nitratis Acidus 106
Unguentum Hydrargyri Nitratis 106
Unguentum Hydrargyri Nitratis Dilutum 106
Hydrargyri Sulphuretum 106
Hydrargyri Persulphas 107
Lithium 108
Lithii Carbonas 108
Liquor Lithiæ Effervescens 108
Lithii Citras 109
Magnesium 110
Magnesia Ponderosa 110
Magnesia Levis 110
Magnesii Carbonas Ponderosa 112
Magnesii Carbonas Levis 112
Liquor Magnesii Carbonatis 113
Liquor Magnesii Citratis 113
Magnesii Sulphas 114
Enema Magnesii Sulphatis 114
Manganesium 115
Manganesii Oxidum Nigrum 115
Plumbum (Lead) 116
Plumbi Oxidum 116
Emplastrum Plumbi 116
Plumbi Iodidum 116
Emplastrum Plumbi Iodidi 117
Unguentum Plumbi Iodidi 117
Plumbi Acetas 117
Pilula Plumbi cum Opio 117
Suppositoria Plumbi Composita 117
Unguentum Plumbi Acetatis 118
Liquor Plumbi Subacetatis 118
Glycerinum Plumbi Subacetatis 119
Liquor Plumbi Subacetatis Dilutus 119
Unguentum Glycerini Plumbi Subacetatis 119
Plumbi Carbonas 119
Unguentum Plumbi Carbonatis 120
Plumbi Nitras 120
Potassium 120
Liquor Potassæ 121
Potassa Caustica 123

PAGE
Potassii Carbonas . . . 123
Potassii Bicarbonas . . . 124
Liquor Potassæ Effervescens . . . 125
Potassii Acetas . . . 125
Potassii Citras . . . 126
Potassii Tartras . . . 127
Potassii Tartras Acida . . . 128
Potassii Sulphas . . . 128
Potassii Nitras . . . 129
Argenti et Potassii Nitras . . . 130
Potassii Chloras . . . 130
Troschisci Potassii Chloratis . . . 130
Potassii Permanganas . . . 131
Liquor Potassii Permanganatis . . . 132
Potassii Iodidum . . . 132
Unguentum Potassii Iodidi . . . 133
Linimentum Potassii Iodidi cum Sapone . . . 133
Potassii Bromidum . . . 134
Potassii Ferrocyanidum . . . 135
Potassii Cyanidum . . . 135
Potassii Bichromas . . . 135
Potassa Sulphurata . . . 135
Unguentum Potassæ Sulphuratæ . . . 136
Sodium . . . 136
Liquor Sodæ . . . 137
Soda Caustica . . . 137
Sodii Carbonas . . . 138
Sodii Carbonas Exsiccata . . . 138
Sodii Bicarbonas . . . 139
Liquor Sodæ Effervescens . . . 139
Trochisci Sodii Bicarbonatis . . . 139
Sodii Sulphas . . . 140
Sodii Sulphis . . . 140
Hyposulphite of Sodium . . . 141
Sodii Nitras . . . 141
Sodii Phosphas . . . 141
Sodii Hypophosphis . . . 142
Borax . . . 143
Mel Boracis . . . 143
Glycerinum Boracis . . . 143
Liquor Sodæ Chlorinatæ . . . 144
Cataplasma Sodæ Chlorinatæ . . . 144
Sodii Chloridum . . . 145
Sodii Bromidum . . . 145
Sodii Iodidum . . . 145
Soda Tartarata . . . 146
Sodii Citro-Tartras Effervescens . . . 146
Liquor Sodii Ethylatis . . . 147
Stannum (Tin) . . . 147
Zincum (Zinc) . . . 148
Granulated Zinc . . . 148
Calamina Præparata . . . 148
Unguentum Calaminæ . . . 148
Zinci Oxidum . . . 148
Unguentum Zinci . . . 149

PAGE
Zinci Chloridum 149
Liquor Zinci Chloridi 150
Zinci Sulphas 150
Zinci Carbonas 151
Zinci Acetas 152

ALCOHOLIC AND ETHEREAL PREPARATIONS, CHLOROFORM, ETC.

Alcohol Ethylicum 152
Spiritus Rectificatus 153
Spiritus Tenuior 153
Spiritus Vini Gallici 154
Mistura Spiritus Vini Gallici 154
Vinum Xericum 155
Vinum Aurantii 156
Cerevisiæ Fermentum 156
Cataplasma Fermenti 156
Æther 157
Æther Purus 158
Spiritus Ætheris 158
Spiritus Ætheris Compositus 158
Æther Aceticus 159
Spiritus Ætheris Nitrosi 160
Chloroformum 161
Aqua Chloroformi 162
Linimentum Chloroformi 162
Spiritus Chloroformi 162
Tinctura Chloroformi Composita 162
Tinctura Chloroformi et Morphinæ 162
Iodoformum 166
Suppositoria Iodoformi 166
Unguentum Iodoformi 166
Tetrachloride of Carbon 167
Bichloride of Methylene 167
Alcohol Amylicum 167
Amyl Nitris 168
Nitroglycerinum 169
Tabellæ Nitroglycerini 169
Chloral Hydras 170
Syrupus Chloral 170
Butyl-Chloral Hydras 172
Nitrous Oxide Gas 173

HYDROCARBONS.

Creasotum 175
Mistura Creasoti 175
Unguentum Creasoti 175
Vapor Creasoti 175
Acidum Carbolicum 176
Acidum Carbolicum Liquefactum 176
Glycerinum Acidi Carbolici 177
Suppositoria Acidi Carbolici cum Sapone 177
Unguentum Acidi Carbolici 177

PAGE
Zinci Sulphocarbolas . . . 178
Sodii Sulphocarbolas . . . 178
Acidum Salicylicum . . . 179
Unguentum Acidum Salicylici . . . 179
Sodii Salicylas . . . 180
Paraffinum Durum . . . 181
Paraffinum Molle . . . 181

ORGANIC SUBSTANCES.

VEGETABLE KINGDOM.

Directions for Collecting and Preserving Vegetable Products . 182

CLASS I. EXOGENÆ.

Nat. Ord. RANUNCULACEÆ.

Aconiti Folia . . . 182
Aconiti Radix . . . 183
Aconitina . . . 183
Extractum Aconiti (leaves) . . . 184
Tinctura Aconiti (root) . . . 184
Linimentum Aconiti (root) . . . 184
Unguentum Aconitinæ (alkaloid) . . . 184
Podophylli Rhizoma . . . 186
Podophylli Resina . . . 186
Tinctura Podophylli . . . 187
Staphisagriæ Semina . . . 187
Unguentum Staphisagriæ . . . 187
Cimicifugæ Rhizoma . . . 188
Extractum Cimicifugæ Liquidum . . . 188
Tinctura Cimicifugæ . . . 188

Nat. Ord. MAGNOLIACEÆ.

Anisi Stellati Fructus . . . 189

Nat. Ord. MENISPERMACEÆ.

Calumbæ Radix . . . 189
Extractum Calumbæ . . . 189
Infusum Calumbæ . . . 190
Tinctura Calumbæ . . . 190
Pareiræ Radix . . . 190
Decoctum Pareiræ . . . 191
Extractum Pareiræ . . . 191
Extractum Pareiræ Liquidum . . . 191
Cocculus . . . 191
Unguentum Cocculi . . . 192

Nat. Ord. PAPAVERACEÆ.

	PAGE
Papaveris Capsulæ	192
Decoctum Papaveris	192
Extractum Papaveris	192
Syrupus Papaveris	193
Opium	193
Morphinæ Acetas	193
Morphinæ Hydrochloras	193
Morphinæ Sulphas	193
Codeina	193
Apomorphinæ Hydrochloras	194
Acidum Meconicum	194
Confectio Opii	201
Emplastrum Opii	201
Enema Opii	201
Extractum Opii	201
Extractum Opii Liquidum	201
Linimentum Opii	201
Pilula Saponis Composita	201
Pilula Plumbi cum Opio	201
Pilula Ipecacuanhæ cum Scilla	201
Pulvis Cretæ Aromaticus cum Opio	202
Pulvis Ipecacuanhæ Compositus	202
Pulvis Kino Compositus	202
Pulvis Opii Compositus	202
Tinctura Opii	202
Tinctura Camphoræ Composita	202
Tinctura Opii Ammoniata	202
Trochisci Opii	202
Unguentum Gallæ cum Opio	202
Vinum Opii	202
Liquor Morphinæ Hydrochloratis	203
Suppositoria Morphinæ	203
Suppositoria Morphinæ cum Sapone	203
Tinctura Chloroformi et Morphinæ	203
Trochisci Morphinæ	203
Trochisci Morphinæ et Ipecacuanhæ	203
Liquor Morphinæ Acetatis	203
Injectio Morphinæ Hypodermica	203
Injectio Apomorphinæ Hypodermica	204
Liquor Morphinæ Bimeconatis	204
Rhœados Petala	212
Syrupus Rhœados	212

Nat. Ord. CRUCIFERÆ, or BRASSICACEÆ.

Sinapis Albæ Semina	213
Sinapis Nigræ Semina	213
Sinapis	213
Oleum Sinapis	213
Cataplasma Sinapis	214
Charta Sinapis	214
Linimentum Sinapis Compositum	214
Armoraciæ Radix	215
Spiritus Armoraciæ Compositus	215

Nat. Ord. POLYGALACEÆ.

PAGE
Senegæ Radix . . . 215
Infusum Senegæ . . . 216
Tinctura Senegæ . . . 216
Krameriæ Radix . . . 216
Extractum Krameriæ . . . 217
Infusum Krameriæ . . . 217
Tinctura Krameriæ . . . 217

Nat. Ord. LINACEÆ.

Lini Semina . . . 217
Lini Farina . . . 217
Lini Oleum . . . 217
Cataplasma Lini (meal) . . . 218
Infusum Lini (seed) . . . 218

Nat. Ord. MALVACEÆ.

Gossypium . . . 218
Pyroxylin . . . 219
Collodium . . . 219
Collodium Flexile . . . 219
Collodium Vesicans . . . 220

Nat. Ord. AURANTIACEÆ.

Aurantii Fructus . . . 220
Aurantii Cortex . . . 220
Aqua Aurantii Floris . . . 220
Infusum Aurantii (peel) . . . 220
Infusum Aurantii Compositum (peel) . . . 220
Syrupus Aurantii (peel) . . . 220
Tinctura Aurantii (peel) . . . 220
Tinctura Aurantii Recentis (peel) . . . 221
Syrupus Aurantii Floris . . . 221
Limonis Cortex . . . 221
Oleum Limonis . . . 221
Limonis Succus . . . 221
Syrupus Limonis (peel and juice) . . . 222
Tinctura Limonis (peel) . . . 222
Belæ Fructus . . . 223
Extractum Belæ Liquidum . . . 223

Nat. Ord. BYTTNERIACEÆ.

Oleum Theobromatis . . . 224

Nat. Ord. SAPINDACEÆ.

Guarana . . . 224

Nat. Ord. ERYTHROXYLACEÆ.

Coca . . . 225
Cocainæ Hydrochloras . . . 225
Extractum Cocæ Liquidum . . . 226
Lamellæ Cocainæ . . . 226

PAGE

Nat. Ord. CAMELLIACEÆ.

Thea 226
Caffeina 227
Caffeinæ Citras 228

Nat. Ord. GUTTIFERÆ.

Cambogia 228
Pilula Cambogiæ Composita 229

Nat. Ord. CANELLACEÆ.

Canellæ Cortex 229

Nat. Ord. VITACEÆ.

Uvæ 230

Nat. Ord. ZYGOPHYLLACEÆ.

Guaiaci Lignum 231
Guaiaci Resina 231
Mistura Guaiaci (*resin*) 232
Tinctura Guaiaci Ammoniata (*resin*) 232

Nat. Ord. RUTACEÆ.

Ruta 232
Oleum Rutæ 232
Buchu Folia 233
Infusum Buchu 233
Tinctura Buchu 233
Cuspariæ Cortex 234
Infusum Cuspariæ 234
Jaborandi 235
Pilocarpinæ Nitras 235
Extractum Jaborandi 235
Infusum Jaborandi 235
Tinctura Jaborandi 235

Nat. Ord. SIMARUBACEÆ.

Quassiæ Lignum 237
Extractum Quassiæ 237
Infusum Quassiæ 237
Tinctura Quassiæ 237

Nat. Ord. RHAMNACEÆ.

Rhamni Frangulæ Cortex 238
Extractum Rhamni Frangulæ 238
Extractum Rhamni Frangulæ Liquidum 238
Rhamni Purshiani Cortex 238
Extractum Cascaræ Sagradæ 239
Extractum Cascaræ Sagradæ Liquidum 239

PAGE

Nat. Ord. ANACARDIACEÆ.

MasticHe 239
Rhus Toxicodendron 240

Nat. Ord. AMYRIDACEÆ.

Myrrha 240
Pilula Aloes et Myrrhæ 241
Tinctura Myrrhæ 241
Elemi 241
Unguentum Elemi 242

Nat. Ord. LEGUMINOSÆ.

Glycyrrhiza 242
Extractum Glycyrrhizæ 242
Extractum Glycyrrhizæ Liquidum 242
Pulvis Glycyrrhizæ Compositus 242
Tragacantha 243
Glycerinum Tragacanthæ 243
Mucilago Tragacanthæ 243
Pulvis Tragacanthæ Compositus 243
Mucuna 244
Scoparii Cacumina 244
Decoctum Scoparii 244
Succus Scoparii 244
Pterocarpi Lignum 245
Kino 245
Pulvis Kino Compositus 246
Tinctura Kino 246
Balsamum Peruvianum 246
Balsamum Tolutanum 247
Syrupus Tolutanus 247
Tinctura Tolutana 247
Physostigmatis Semen 248
Physostigmina 248
Extractum Physostigmatis 248
Lamellæ Physostigminæ 248
Chrysarobinum 251
Unguentum Chrysarobini 251
Hæmatoxyli Lignum 251
Decoctum Hæmatoxyli 252
Extractum Hæmatoxyli 252
Senna Alexandrina 252
Senna Indica 252
Confectio Sennæ 253
Infusum Sennæ 253
Mistura Sennæ Composita 253
Syrupus Sennæ 254
Tinctura Sennæ 254
Cassiæ Pulpa 254
Tamarindus 255
Copaiba 255
Oleum Copaibæ 255

PAGE
Acaciæ Gummi 257
Mucilago Acaciæ 258
Catechu Nigrum 258
Indigo 259
Solution of Sulphate of Indigo 259

Nat. Ord. ROSACEÆ.

Rosæ Centifoliæ Petala 259
Aqua Rosæ 259
Rosæ Gallicæ Petala 260
Confectio Rosæ Gallicæ 260
Infusum Rosæ Acidum 260
Syrupus Rosæ Gallicæ 260
Rosæ Caninæ Fructus 261
Confectio Rosæ Caninæ 261
Amygdala Amara 261
Amygdala Dulcis 261
Oleum Amygdalæ 261
Mistura Amygdalæ (seeds) 262
Pulvis Amygdalæ Compositus (seeds) 262
Prunum 263
Laurocerasi Folia 263
Aqua Laurocerasi 263
Cusso 264
Infusum Cusso 264

Nat. Ord. MYRTACEÆ.

Caryophyllum 265
Oleum Caryophylli 265
Infusum Caryophylli 265
Pimenta 266
Oleum Pimentæ 266
Aqua Pimentæ 266
Oleum Cajuputi 266
Spiritus Cajuputi 266
Eucalypti Folia 267
Oleum Eucalypti 267
Unguentum Eucalypti 268
Granati Radicis Cortex 268
Decoctum Granati Radicis 268

Nat. Ord. CUCURBITACEÆ.

Colocynthidis Pulpa 269
Extractum Colocynthidis Compositum 269
Pilula Colocynthidis Composita 270
Pilula Colocynthidis et Hyoscyami 270
Ecballii Fructus 270
Elaterium 270
Elaterinum 270
Pulvis Elaterini Compositus 271

Nat. Ord. UMBELLIFERÆ.

Conii Folia 272

PAGE
Conii Fructus . . . 272
  Cataplasma Conii (leaves) . . . 273
  Extractum Conii (leaves) . . . 273
  Pilula Conii Composita (leaves) . . . 273
  Succus Conii (leaves) . . . 273
  Vapor Coninæ (leaves) . . . 273
  Tinctura Conii (fruit) . . . 273
Asafœtida . . . 275
  Enema Asafœtidæ . . . 275
  Pilula Aloes et Asafœtidæ . . . 275
  Pilula Asafœtidæ Composita . . . 275
  Spiritus Ammoniæ Fœtidus . . . 275
  Tinctura Asafœtidæ . . . 275
Galbanum . . . 276
  Emplastrum Galbani . . . 276
Ammoniacum . . . 277
  Emplastrum Ammoniaci cum Hydrargyro . . . 277
  Mistura Ammoniaci . . . 277
Anisi Fructus . . . 278
Oleum Anisi . . . 278
  Aqua Anisi . . . 278
  Essentia Anisi . . . 278
Fœniculi Fructus . . . 279
  Aqua Fœniculi . . . 279
Coriandri Fructus . . . 279
Oleum Coriandri . . . 279
Carui Fructus . . . 280
Oleum Carui . . . 280
  Aqua Carui . . . 280
Anethi Fructus . . . 280
Oleum Anethi . . . 280
  Aqua Anethi . . . 281
Sumbul Radix . . . 281
  Tinctura Sumbul . . . 281

Nat. Ord. CAPRIFOLIACEÆ.

Sambuci Flores . . . 282
  Aqua Sambuci . . . 282

Nat. Ord. CINCHONACEÆ.

Cinchonæ Cortex . . . 282
Cinchonæ Rubræ Cortex . . . 283
Quininæ Sulphas . . . 283
Quininæ Hydrochloras . . . 283
Cinchonidinæ Sulphas . . . 283
Cinchoninæ Sulphas . . . 283
  Decoctum Cinchonæ . . . 288
  Extractum Cinchonæ Liquidum . . . 289
  Infusum Cinchonæ Acidum . . . 289
  Tinctura Cinchonæ . . . 289
  Tinctura Cinchonæ Composita . . . 289
  Tinctura Quininæ Ammoniata . . . 289
  Vinum Quininæ . . . 289
  Tinctura Quininæ . . . 289

PAGE
Ipecacuanha 296
Pilula Ipecacuanhæ cum Scilla 297
Pulvis Ipecacuanhæ Compositus 297
Trochisci Ipecacuanhæ 297
Vinum Ipecacuanhæ 297
Catechu 299
Infusum Catechu 299
Pulvis Catechu Compositus 300
Tinctura Catechu 300
Trochisci Catechu 300

Nat. Ord. VALERIANACEÆ.

Valerianæ Rhizoma 300
Infusum Valerianæ 301
Tinctura Valerianæ 301
Tinctura Valerianæ Ammoniata 301
Sodii Valerianas 302
Zinci Valerianas 302
Valerianate of Quinine 303

Nat. Ord. COMPOSITÆ.

Pyrethri Radix 303
Tinctura Pyrethri 303
Santonica 304
Santoninum 304
Trochisci Santonini 305
Anthemidis Flores 306
Oleum Anthemidis 306
Infusum Anthemidis (flowers) 306
Extractum Anthemidis (flowers and oil) 306
Taraxaci Radix 306
Decoctum Taraxaci 306
Extractum Taraxaci 306
Extractum Taraxaci Liquidum 306
Succus Taraxaci 306
Lactuca 308
Extractum Lactucæ 308
Arnicæ Rhizoma 308
Tinctura Arnicæ 309

Nat. Ord. LOBELIACEÆ.

Lobelia 309
Tinctura Lobeliæ 310
Tinctura Lobeliæ Ætherea 310

Nat. Ord. ERICACEÆ.

Uvæ Ursi Folia 310
Infusum Uvæ Ursi 311

Nat. Ord. SAPOTACEÆ.

Gutta Percha 311
Liquor Gutta Percha 312

PAGE

Nat. Ord. STYRACACEÆ.

Benzoinum 312
Acidum Benzoicum 312
Tinctura Benzoini Composita 313
Trochisci Acidi Benzoici 313
Ammonii Benzoas 313

Nat. Ord. OLEACEÆ.

Oleum Olivæ 314
Sapo Durus 314
Sapo Mollis 314
Sapo Animalis 314
Linimentum Saponis (hard soap) 315
Pilula Saponis Composita (hard soap) 315
Emplastrum Saponis (curd soap) 315
Emplastrum Saponis Fuscum (curd soap) 315
Acidum Oleicum 316
Oleatum Hydrargyri 317
Oleatum Zinci 317
Unguentum Zinci Oleati 317
Glycerinum 317
Glycerinum Acidi Carbolici 318
Glycerinum Acidi Gallici 318
Glycerinum Acidi Tannici 318
Glycerinum Aluminis 318
Glycerinum Boracis 318
Glycerinum Plumbi Subacetatis 318
Glycerinum Amyli 318
Glycerinum Tragacanthæ 318
Manna 319
Leaves of Fraxinus excelsior 319

Nat. Ord. LOGANIACEÆ.

Nux Vomica 320
Strychnina 320
Extractum Nucis Vomicæ 321
Tinctura Nucis Vomicæ 321
Liquor Strychninæ Hydrochloratis 321
Faba Sancti Ignatii 323
Gelsemium 324
Extractum Gelsemii Alcoholicum 324
Tinctura Gelsemii 324

Nat. Ord. ASCLEPIADACEÆ.

Hemidesmi Radix 325
Syrupus Hemidesmi 325
Condurango 326

Nat. Ord. GENTIANACEÆ.

Gentianæ Radix 326
Extractum Gentianæ 327
Infusum Gentianæ Compositum 327
Tinctura Gentianæ Composita 327

PAGE
Chirata 327
Infusum Chiratæ 327
Tinctura Chiratæ 327

Nat. Ord. CONVOLVULACEÆ.

Scammoniæ Radix 328
Scammonium 328
Scammoniæ Resina 328
Mistura Scammonii (resin) 329
Confectio Scammonii 329
Pilula Scammonii Composita (resin) 329
Pulvis Scammonii Compositus 329
Jalapa 330
Jalapæ Resina 330
Extractum Jalapæ 331
Pulvis Jalapæ Compositus 331
Tinctura Jalapæ 331

Nat. Ord. SOLANACEÆ.

Capsici Fructus 331
Tinctura Capsici 332

Nat. Ord. ATROPACEÆ.

Belladonnæ Folia 332
Belladonnæ Radix 332
Atropina 332
Extractum Belladonnæ (leaves) 333
Succus Belladonnæ (leaves) 333
Tinctura Belladonnæ (leaves) 333
Linimentum Belladonnæ 334
Extractum Belladonnæ Alcoholicum 334
Emplastrum Belladonnæ 334
Unguentum Belladonnæ 334
Unguentum Atropinæ 334
Atropinæ Sulphas 334
Liquor Atropinæ Sulphatis 334
Lamellæ Atropinæ 334
Stramonii Semina 340
Extractum Stramonii 340
Tinctura Stramonii 341
Hyoscyami Folia 341
Extractum Hyoscyami 342
Succus Hyoscyami 342
Tinctura Hyoscyami 342
Tabaci Folia 343

Nat. Ord. SCROPHULARIACEÆ.

Digitalis Folia 344
Infusum Digitalis 344
Tinctura Digitalis 344

PAGE

Nat. Ord. LABIATÆ.

Oleum Rosmarini 346
Spiritus Rosmarini 346
Oleum Lavandulæ 347
Spiritus Lavandulæ 347
Tinctura Lavandulæ Composita 347
Oleum Menthæ Piperitæ 348
Aqua Menthæ Piperitæ 348
Essentia Menthæ Piperitæ 348
Spiritus Menthæ Piperitæ 348
Menthol 348
Oleum Menthæ Viridis 349
Aqua Menthæ Viridis 349
Thymol 349

Nat. Ord. POLYGONACEÆ.

Rhei Radix 350
Extractum Rhei 351
Infusum Rhei 351
Pilula Rhei Composita 351
Pulvis Rhei Compositus 351
Syrupus Rhei 351
Tinctura Rhei 351
Vinum Rhei 351

Nat. Ord. MYRISTICACEÆ.

Myristica 352
Oleum Myristicæ Expressum 352
Oleum Myristicæ 352
Spiritus Myristicæ (volatile oil) 353

Nat. Ord. LAURACEÆ.

Cinnamomi Cortex 353
Oleum Cinnamomi 354
Aqua Cinnamomi (bark) 354
Pulvis Cinnamomi Compositus (bark) 354
Tinctura Cinnamomi (bark) 354
Spiritus Cinnamomi (volatile oil) 354
Camphora 355
Aqua Camphoræ 355
Linimentum Camphoræ 355
Linimentum Camphoræ Compositum 355
Spiritus Camphoræ 355
Tinctura Camphoræ Composita 355
Sassafras 356
Nectandræ Cortex 357
Beberinæ Sulphas 357

Nat. Ord. ARISTOLOCHIÆ.

Serpentariæ Rhizoma 358
Infusum Serpentariæ 358
Tinctura Serpentariæ 358

PAGE

Nat. Ord. THYMELACEÆ.

Mezerei Cortex 359
Extractum Mezerei Æthereum 359

Nat. Ord. EUPHORBIACEÆ.

Cascarillæ Cortex 360
Infusum Cascarillæ 360
Tinctura Cascarillæ 360
Oleum Crotonis 361
Linimentum Crotonis 361
Oleum Ricini 362
Kamala 362

Nat. Ord. SANTALACEÆ.

Oleum Santali 363

Nat. Ord. PIPERACEÆ.

Piper Nigrum 363
Confectio Piperis 364
Cubeba 364
Oleum Cubebæ 364
Oleo-resina Cubebæ 364
Tinctura Cubebæ 365
Maticæ Folia 365
Infusum Maticæ 365

Nat. Ord. SALICACEÆ.

Salicinum 366

Nat. Ord. LIQUIDAMBARACEÆ.

Styrax Præparatus 367

Nat. Ord. CUPULIFERÆ.

Quercûs Cortex 368
Decoctum Quercûs 369
Galla 369
Acidum Tannicum 369
Acidum Gallicum 369
Tinctura Gallæ 371
Unguentum Gallæ 371
Unguentum Gallæ cum Opio 371
Glycerinum Acidi Tannici 371
Suppositoria Acidi Tannici 371
Suppositoria Acidi Tannici cum Sapone 371
Trochisci Acidi Tannici 371
Glycerinum Acidi Gallici 371

Nat. Ord. MORACEÆ.

Ficus 373
Mori Succus 373
Syrupus Mori 373

PAGE

Nat. Ord. CANNABINACEÆ.

Cannabis Indica 374
Extractum Cannabis Indicæ 374
Tinctura Cannabis Indicæ 374
Lupulus 375
Lupulinum 375
Infusum Lupuli 376
Tinctura Lupuli 376
Extractum Lupuli 376

Nat. Ord. CONIFERÆ or PINACEÆ.

Oleum Terebinthinæ 377
Resina 377
Confectio Terebinthinæ 378
Enema Terebinthinæ 378
Linimentum Terebinthinæ 378
Linimentum Terebinthinæ Aceticum 378
Unguentum Terebinthinæ 378
Emplastrum Resinæ 378
Unguentum Resinæ 378
Terebinthina Canadensis 379
Laricis Cortex 380
Tinctura Laricis 380
Thus Americanum 380
Pix Burgundica 381
Emplastrum Picis 381
Oleum Pini Sylvestris 381
Vapor Olei Pini Sylvestris 381
Pix Liquida 382
Unguentum Picis Liquidæ 382
Oleum Juniperi 382
Spiritus Juniperi 383
Oleum Cadinum 383
Sabinæ Cacumina 383
Oleum Sabinæ 384
Tinctura Sabinæ 384
Unguentum Sabinæ 384

CLASS II. ENDOGENÆ.

Nat. Ord. ZINGIBERACEÆ.

Zingiber 384
Syrupus Zingiberis 385
Tinctura Zingiberis 385
Tinctura Zingiberis Fortior 385
Cardamomi Semina 385
Tinctura Cardamomi Composita 386

Nat. Ord. IRIDACEÆ.

Crocus 386
Tinctura Croci 387

PAGE

Nat. Ord. SMILACEÆ.

Sarsæ Radix 387
Decoctum Sarsæ 389
Decoctum Sarsæ Compositum 389
Extractum Sarsæ Liquidum 389

Nat. Ord. LILIACEÆ.

Scilla 390
Acetum Scillæ 390
Oxymel Scillæ 390
Pilula Scillæ Composita 390
Pilula Ipecacuanhæ cum Scilla 390
Syrupus Scillæ 390
Tinctura Scillæ 390
Aloe Barbadensis 391
Aloe Socotrina 391
Aloin 391
Enema Aloes (Barbadoes or Socotrine) 392
Extractum Aloes Barbadensis 392
Pilula Aloes Barbadensis 392
Pilula Aloes et Ferri (Barbadoes) 392
Decoctum Aloes Compositum (Socotrine) 392
Extractum Aloes Socotrinæ 393
Pilula Aloes Socotrinæ 393
Pilula Aloes et Asafœtidæ (Socotrine) 393
Pilula Aloes et Myrrhæ (Socotrine) 393
Tinctura Aloes (Socotrine) 393
Vinum Aloes (Socotrine) 393

Nat. Ord. MELANTHACEÆ.

Veratri Viridis Rhizoma 394
Tinctura Veratri Viridis 395
Sabadilla 395
Veratrina 396
Unguentum Veratrinæ 396
Colchici Cormus 397
Colchici Semina 397
Extractum Colchici (corm) 398
Extractum Colchici Aceticum (corm) 398
Vinum Colchici (corm) 398
Tinctura Colchici Seminum 398

Nat. Ord. GRAMINACEÆ.

Farina Tritici 399
Mica Panis 399
Amylum 399
Glycerinum Amyli 400
Mucilago Amyli 400
Hordeum Decorticatum 401
Decoctum Hordei 401

PAGE
Ergota 401
Extractum Ergotæ Liquidum 402
Infusum Ergotæ 402
Tinctura Ergotæ 402
Ergotinum 402
Injectio Ergotini Hypodermica 402
Saccharum Purificatum 403
Syrupus 404
Theriaca 404

CLASS III. ACOTYLEDONES.

Nat. Ord. FILICES.

Filix Mas 405
Extractum Filicis Liquidum 405

Nat. Ord. LICHENES.

Cetraria 406
Decoctum Cetrariæ 406

ANIMAL KINGDOM.

CLASS, MAMMALIA.

Ord. RUMINANTIA.

Moschus 407
Sevum Præparatum 408
Lac 408
Saccharum Lactis 408
Fel Bovinum Purificatum 409
Pepsin 410

Ord. PACHYDERMATA.

Adeps Præparatus 412
Adeps Benzoatus 412
Unguentum Simplex 413

Ord. CETACEA.

Cetaceum 413
Unguentum Cetacei 413

CLASS, AVES.

Ovi Albumen 413
Ovi Vitellus 414

PAGE

CLASS, PISCES.

Oleum Morrhuæ 414
Trimethylamin 417

CLASS, INSECTA.

Ord. HYMENOPTERA.

Mel 418
Mel Depuratum 418
Oxymel 418
Cera Flava 418
Cera Alba 418
Unguentum Simplex 419

Ord. HEMIPTERA.

Coccus 419
Tinctura Cocci 420

Ord. COLEOPTERA.

Cantharis 420
Acetum Cantharidis 421
Charta Epispastica 421
Emplastrum Cantharidis 421
Emplastrum Calefaciens 421
Liquor Epispasticus 421
Tinctura Cantharidis 422
Unguentum Cantharidis 422

CLASS, ANNELIDA.

Hirudo 424

CLASS, SPONGIDA.

Spongia Usta 425

THERAPEUTICS.

Introductory Remarks 426
Form in which Medicines should be Exhibited, and Time of Administration 427
Incompatibility in Prescribing 429
Mode in which Medicines are introduced into the System . . 431

CLASSIFICATION OF MEDICINES.

PAGE
Introductory Remarks 433
Table of Classes of Medicines 434

DIVISION I.—INTERNAL REMEDIES 436
Class I.—Medicines which act upon the Blood 436

Class II.—Medicines acting on the Nervous System . . . 442
  Sub-Class 1.—On Brain Proper 442
  Sub-Class 2.—On Spinal Cord 444
  Sub-Class 3.—On Different Portions of the Nervous System 446

Class III.—Medicines acting chiefly on the Heart and Circulatory System 447

Class IV.—Medicines acting upon Special Organs . . . 450
  Sub-Class 1.—On the Alimentary Canal . . . 450
  Sub-Class 2.—On the Respiratory Organs . . 459
  Sub-Class 3.—On the Skin 461
  Sub-Class 4.—On the Kidneys and Urinary Organs . 463
  Sub-Class 5.—On the Generative Organs . . . 466
  Sub-Class 6.—On the Eyes 468

DIVISION II.—EXTERNAL REMEDIES 469

DIVISION III.—ANTIDOTES, DISINFECTANTS, AND ANTISEPTICS . 473

APPENDIX.

I. MINERAL WATERS 475
II. ARTICLES EMPLOYED IN CHEMICAL TESTING . . . 480
III. TEST SOLUTIONS 484
IV. VOLUMETRIC SOLUTIONS 495
V. POSOLOGICAL TABLE 504
VI. PROPORTIONS OF THE MORE IMPORTANT DRUGS IN OFFICIAL PREPARATIONS 518

INDEX. 523

Articles and Preparations included in the British Pharmacopœia of 1885, which were not in that of 1867 nor in the 'Additions' of 1874.

Acidum Boricum
,, Carbolicum Liquefactum
,, Chromicum
,, Hydrobromicum Dilutum
,, Lacticum
,, Lacticum Dilutum
,, Meconicum
,, Oleicum
,, Phosphoricum Concentratum
,, Salicylicum
Alcohol Ethylicum
Aloin
Apomorphinæ Hydrochloras
Argenti et Potassii Nitras
Arsenii Iodidum
Bismuthi Citras
,, et Ammonii Citras
Butyl-Chloral Hydras
Caffeina
Caffeinæ Citras
Calamina Præparata
Calcii Sulphas
Calx Sulphurata
Chrysarobinum
Cimicifugæ Rhizoma
Cinchonidinæ Sulphas
Cinchoninæ Sulphas
Coca
Cocainæ Hydrochloras
Codeina
Collodium Vesicans
Cupri Nitras
Elaterinum
Ergotinum
Extractum Belladonnæ Alcoholicum
,, Cascaræ Sagradæ
,, ,, ,, Liquidum
,, Cimicifugæ Liquidum
,, Cocæ Liquidum
,, Gelsemii Alcoholicum
,, Jaborandi
,, Rhamni Frangulæ
,, ,, ,, Liquidum
,, Taraxaci Liquidum
Gelsemium
Glycerinum Aluminis
,, Plumbi Subacetatis
,, Tragacanthæ
Infusum Jaborandi
Injectio Apomorphinæ Hypodermica
,, Ergotini Hypodermica
Iodoformum
Jaborandi
Lamellæ Atropinæ
,, Cocainæ
,, Physostigminæ
Liquor Acidi Chromici
,, Ammonii Acetatis Fortior
,, ,, Citratis Fortior
,, Arsenii et Hydrargyri Iodi
,, Calcii Chloridi
,, Ferri Acetatis
,, ,, ,, Fortior
,, ,, Dialysatus
,, Morphinæ Bimeconatis
,, Sodii Ethylatis
Lupulinum
Menthol
Morphinæ Sulphas
Oleatum Hydrargyri
,, Zinci
Oleo-Resina Cubebæ
Oleum Eucalypti
,, Pini Sylvestris
,, Santali
Paraffinum Durum
,, Molle
Physostigmina
Pilocarpinæ Nitras
Potassii Cyanidum
Quininæ Hydrochloras
Rhamni Frangulæ Cortex
,, Purshiani Cortex
Salicinum
Sodii Bromidum
,, Iodidum
,, Salicylas
,, Sulphis
,, Sulphocarbolas
Sodium

Spiritus Ætheris Compositus
,, Cinnamomi
Staphisagriæ Semina
Suppositoria Iodoformi
Tabellæ Nitroglycerini
Thymol
Tinctura Chloroformi et Morphinæ
,, Cimicifugæ
,, Gelsemii
,, Jaborandi
,, Podophylli
Trochisci Santonini
Unguentum Acidi Borici
Unguentum Acidi Carbolici
,, ,, Salicylici
,, Calaminæ
,, Chrysarobini
,, Eucalypti
,, Hydrargyri Nitratis Dilutum
,, Iodoformi
,, Staphisagriæ
,, Zinci Oleati
Vapor Olei Pini Sylvestris
Zinci Sulphocarbolas

Articles and Preparations included in the British Pharmacopœia of 1867 or in the 'Additions' of 1874, but omitted in the British Pharmacopœia of 1885.

Areca
Cadmii Iodidum
Castoreum
Decoctum Ulmi
Digitalinum
Dulcamara
Enema Tabaci
Ferri Iodidum
,, Oxidum Magneticum
,, Peroxidum Humidum
Hydrargyri Iodidum Viride
Infusum Dulcamaræ
Liquor Atropiæ
Mistura Gentianæ
Pilula Quiniæ
Rhamni Succus
Sodæ Acetas
Stramonii Folia
Syrupus Rhamni
Tinctura Castorei
Ulmi Cortex
Unguentum Cadmii Iodidi

ARTICLES AND PREPARATIONS THE NAMES OF WHICH HAVE BEEN ALTERED.

Former Names, 1867 *or* 1874.	*Present Names*, 1885.
Aconitia	Aconitina.
Albumen Ovi	Ovi Albumen.
Ammoniæ Benzoas	Ammonii Benzoas
Ammoniæ Carbonas	Ammonii Carbonas.
Ammoniæ Nitras	Ammonii Nitras.
Ammoniæ Phosphas	Ammonii Phosphas.
Arnicæ Radix	Arnicæ Rhizoma.
Assafœtida	Asafœtida.
Atropia	Atropina.
Atropiæ Sulphas	Atropinæ Sulphas.
Beberiæ Sulphas	Beberinæ Sulphas.
Calcis Carbonas Præcipitata	Calcii Carbonas Præcipitata.
Calcis Hydras	Calcii Hydras.
Calcis Hypophosphis	Calcii Hypophosphis.
Calcis Phosphas	Calcii Phosphas.
Calx Chlorata	Calx Chlorinata.
Canellæ Albæ Cortex	Canellæ Cortex.
Cardamomum	Cardamomi Semina.
Catechu Pallidum	Catechu.
Cinchonæ Flavæ Cortex	Cinchonæ Cortex.
Cinchonæ Pallidæ Cortex	Cinchonæ Cortex.
Decoctum Cinchonæ Flavæ	Decoctum Cinchonæ [Rubræ].
Ecbalii Fructus	Ecballii Fructus.
Emplastrum Cerati Saponis	Emplastrum Saponis Fuscum.
Enema Assafœtida	Enema Asafœtida.
Enema Magnesiæ Sulphatis	Enema Magnesii Sulphatis.
Extractum Cinchonæ Flavæ Liquidum	Extractum Cinchonæ [Rubræ] Liquidum.
Ferri et Ammoniæ Citras	Ferri et Ammonii Citras.
Ferri et Quiniæ Citras	Ferri et Quininæ Citras.
Hydrargyri Sulphas	Hydrargyri Persulphas.
Infusum Cinchonæ Flavæ	Infusum Cinchonæ [Rubræ] Acidum.
Liquor Ammoniæ Acetatis	Liquor Ammonii Acetatis.
Liquor Ammoniæ Citratis	Liquor Ammonii Citratis.
Liquor Atropiæ Sulphatis	Liquor Atropinæ Sulphatis.
Liquor Bismuthi et Ammoniæ Citratis	Liquor Bismuthi et Ammonii Citratis.
Liquor Calcis Chloratæ	Liquor Calcis Chlorinatæ.
Liquor Magnesiæ Carbonatis	Liquor Magnesii Carbonatis.
Liquor Magnesiæ Citratis	Liquor Magnesii Citratis.
Liquor Morphiæ Acetatis	Liquor Morphinæ Acetatis.
Liquor Morphiæ Hydrochloratis	Liquor Morphinæ Hydrochloratis.
Liquor Potassæ Permanganatis	Liquor Potassii Permanganatis.
Liquor Sodæ Arseniatis	Liquor Sodii Arseniatis.
Liquor Sodæ Chloratæ	Liquor Sodæ Chlorinatæ.
Liquor Strychniæ	Liquor Strychninæ Hydrochloratis.
Lithiæ Carbonas	Lithii Carbonas.

Former Names, 1867 *or* 1874.	*Present Names,* 1885.
Lithiæ Citras	Lithii Citras.
Magnesia	Magnesia Ponderosa.
Magnesiæ Carbonas	Magnesii Carbonas Ponderosa.
Magnesiæ Carbonas Levis	Magnesii Carbonas Levis.
Magnesiæ Sulphas	Magnesii Sulphas.
Morphiæ Acetas	Morphinæ Acetas.
Morphiæ Hydrochloras	Morphinæ Hydrochloras.
Physostigmatis Faba	Physostigmatis Semen.
Pilula Aloes et Assafœtidæ	Pilula Aloes et Asafœtidæ.
Pilula Assafœtidæ Composita	Pilula Asafœtidæ Composita.
Podophylli Radix	Podophylli Rhizoma.
Potassæ Acetas	Potassii Acetas.
Potassæ Bicarbonas	Potassii Bicarbonas.
Potassæ Bichromas	Potassii Bichromas.
Potassæ Carbonas	Potassii Carbonas.
Potassæ Chloras	Potassii Chloras.
Potassæ Citras	Potassii Citras.
Potassæ Nitras	Potassii Nitras.
Potassæ Permanganas	Potassii Permanganas.
Potassæ Prussias Flava	Potassii Ferrocyanidum.
Potassæ Sulphas	Potassii Sulphas.
Potassæ Tartras	Potassii Tartras.
Potassæ Tartras Acida	Potassii Tartras Acida.
Quiniæ Sulphas	Quininæ Sulphas.
Serpentariæ Radix	Serpentariæ Rhizoma.
Sodæ Arsenias	Sodii Arsenias.
Sodæ Bicarbonas	Sodii Bicarbonas.
Sodæ Carbonas	Sodii Carbonas.
Sodæ Carbonas Exsiccata	Sodii Carbonas Exsiccata.
Sodæ Citro-tartras Effervescens	Sodii Citro-tartras Effervescens.
Sodæ Hypophosphis	Sodii Hypophosphis.
Sodæ Nitras	Sodii Nitras.
Sodæ Phosphas	Sodii Phosphas.
Sodæ Sulphas	Sodii Sulphas.
Sodæ Valerianas	Sodii Valerianas.
Strychnia	Strychnina.
Suppositoria Morphiæ	Suppositoria Morphinæ.
Suppositoria Morphiæ cum Sapone	Suppositoria Morphinæ cum Sapone.
Tinctura Assafœtidæ	Tinctura Asafœtidæ.
Tinctura Quiniæ	Tinctura Quininæ.
Tinctura Quiniæ Ammoniata	Tinctura Quininæ Ammoniata.
Trochisci Morphiæ	Trochisci Morphinæ.
Trochisci Morphiæ et Ipecacuanhæ	Trochisci Morphinæ et Ipecacuanhæ.
Trochisci Potassæ Chloratis	Trochisci Potassii Chloratis.
Trochisci Sodæ Bicarbonatis	Trochisci Sodii Bicarbonatis.
Unguentum Aconitiæ	Unguentum Aconitinæ.
Unguentum Atropiæ	Unguentum Atropinæ.
Unguentum Veratriæ	Unguentum Veratrinæ.
Valerianæ Radix	Valerianæ Rhizoma.
Vapor Coniæ	Vapor Coninæ.
Veratri Viridis Radix	Veratri Viridis Rhizoma.
Veratria	Veratrina.
Vinum Quiniæ	Vinum Quininæ.

SUBSTITUTIONS.

Antimonium Nigrum Purificatum	for	Antimonium Nigrum.
Cinchonæ Rubræ Cortex (in preparations)	,,	Cinchonæ Flavæ Cortex. Cinchonæ Pallidæ Cortex.
Pulvis Elaterini Compositus	,,	Pulvis Elaterii Compositus.
Tinctura Cinchonæ [Rubræ]	,,	Tinctura Cinchonæ Flavæ.
Unguentum Glycerini Plumbi Subacetatis	,,	Unguentum Plumbi Subacetatis Compositum.

PREPARATIONS THE COMPOSITION OF WHICH HAS BEEN ALTERED.

(Minor alterations are not included.)

Acidum Sulphurosum.
Alumen
Antimonium Sulphuratum.
Extractum Cinchonæ Liquidum.
Infusum Cinchonæ Acidum.
Injectio Morphinæ Hypodermica.
Liquor Epispasticus.
Liquor Iodi.
Oleum Phosphoratum.
Pilula Phosphori.
Pulvis Glycyrrhizæ Compositus.
Tinctura Quininæ.
Unguentum Hydrargyri Ammoniati.
The fatty basis of the four suppositories of B. P. 1867, is now oil of theobroma only.
In some of the ointments paraffins have been substituted for lard.
Scammony Resin has been substituted for Scammony in most preparations of Scammony.

The strengths of the following preparations have been altered from 1 *in* 109 *to* 1 *in* 100.

Liquor Arsenicalis.
Liquor Arsenici Hydrochloricus.
Liquor Atropinæ Sulphatis.
Liquor Morphinæ Acetatis.
Liquor Morphinæ Hydrochloratis.
Liquor Potassii Permanganatis.
Liquor Sodii Arseniatis
Liquor Strychninæ Hydrochloratis.

[illegible] SCHOOL OF MEDICINE

MATERIA MEDICA.

INTRODUCTION.

In the various preparations contained in the first part of this work, constant reference is made to weights and measures, temperature, &c.; and it is therefore important that these should be clearly understood.

The weights and measures of the British Pharmacopœia are as follows:—

WEIGHTS.

1 Grain	gr. =	weight of $\frac{1}{252\cdot456}$	cubic inch of pure water.
1 Ounce	oz. =		437·5 grains.
1 Pound	lb. =	16 ounces =	7000 ,,

MEASURES OF CAPACITY.

1 Minim	min.	
1 Fluid drachm	fl. drm. . . =	60 minims.
1 Fluid ounce	fl. oz. . . . =	8 fluid drachms.
1 Pint	O. . . . =	20 fluid ounces.
1 Gallon	C. . . . =	8 pints.

MEASURES OF LENGTH.

1 inch in.
12 inches = 1 foot.
36 inches = 3 feet = 1 yard.

RELATION OF MEASURES TO WEIGHTS.

1 Minim is the measure of	. . .	0·9114583	grains of water.
1 Fluid drachm ,,	. . .	54·6875	,,
1 Fluid ounce ,,	1 ounce or .	437·5	,,
1 Pint ,,	1·25 pounds or	8750·0	,,
1 Gallon ,,	10 pounds or	70,000·0	,,

1 Cubic inch of distilled water, in air, at 62° F. (16°·66 C.) = 252·456 grs

WEIGHTS AND MEASURES OF THE METRICAL SYSTEM.

WEIGHTS.

1 Milligramme	= the thousandth	part of one gram. or	0·001	grm.
1 Centigramme	= the hundredth	,,	0·01	,,
1 Decigramme	= the tenth	,,	0·1	,,
1 Gramme	= weight of a cubic centimetre of water at 4° C. (39°·2 F.)		1·0	,,
1 Dekagramme	= ten grammes	,,	10·0	,,
1 Hectogramme	= one hundred grammes	,,	100·0	,,
1 Kilogramme	= one thousand grammes	,,	1000·0	,,

MEASURES OF CAPACITY.

1 Millilitre	=	1	cub. centim. or the mea. of	1	grm.	of water.
1 Centilitre	=	10	,,	10	,,	,,
1 Decilitre	=	100	,,	100	,,	,,
1 Litre	=	1000	,,	1000	,,	(1 kilo.)

MEASURES OF LENGTH.

1 Millimetre	= the thousandth	part of one metre or	0·001	metre.
1 Centimetre	= the hundredth	,,	0·01	,,
1 Decimetre	= the tenth part	,,	0·1	,,
1 Metre	= the ten-millionth part of a quarter of the meridian of the earth.			

RELATION OF THE WEIGHTS OF THE BRITISH PHARMACOPŒIA TO THE METRICAL WEIGHTS.

1 Pound = 453·5927 grammes.
1 Ounce = 28·3495 ,,
1 Grain = 0·0648 ,,

RELATION OF MEASURES OF CAPACITY OF THE BRITISH PHARMACOPŒIA TO THE METRICAL MEASURES.

1 Gallon	= 4·543458	litres.		
1 Pint	= 0·567932	,,	or 567·932	cubic centimetres.
1 Fluid ounce	= 0·028397	,,	28·397	,,
1 Fluid drachm	= 0·003550	,,	3·550	,,
1 Minim	= 0·000059	,,	0·059	,,

RELATION OF THE METRICAL WEIGHTS TO THE WEIGHTS OF THE BRITISH PHARMACOPŒIA.

1 Milligramme = 0·015432 grs.
1 Centigramme = 0·15432 ,,
1 Decigramme = 1·5432 ,,
1 Gramme = 15·432 ,,
1 Kilogramme = 2 lbs. 3 oz. 119·8 grs. or 15432·349 grs.

RELATION OF THE METRICAL MEASURES TO THE MEASURES OF THE BRITISH PHARMACOPŒIA.

1 Millimetre = 0·03937 inches.
1 Centimetre = 0·39371 ,,
1 Decimetre = 3·93708 ,,
1 Metre = 39·37079 ,, or 1 yard 3·37 inches.
1 Cubic centimetre = 15·432 grains.
1 Litre = 1·76077 pint, or 1 pint 15 oz. 1 dr. 43 m.

The cubic centimetre is a standard at 4° C. (39°·2 F.), the grain at 62° F. (16°·66 C.).

All liquids are ordered by measure unless it is stated otherwise.

It will be seen that the solid drachm and the scruple have been omitted from the Pharmacopœia; when the signs ʒj and ℈j are made use of, they represent sixty and twenty grains respectively, and not the eighth and twenty-fourth part of the avoirdupois ounce.

The avoirdupois fluid ounce corresponds to the solid ounce, in the case of distilled water at 60° F. (15°·6 C.); that is, one fluid ounce weighs exactly an ounce. A minim of distilled water, however, does not weigh one grain, as the fluid ounce is divided into 480 minims; the solid ounce into 437·5 grains only.

GROUPS OF PHARMACOPŒIA PREPARATIONS.

The following remarks concerning certain groups of pharmaceutic preparations contained in the British Pharmacopœia may prove of service to the reader, by enabling him to discover at a glance the nature of their more important general characters, and facilitating the understanding of some peculiarities in nomenclature and methods of preparation found in many of them.

Acida. Acids. Among this group, directions are found for making certain *dilute acids*, and the same rule has in most instances been followed; for example, Acidum Hydrochloricum Dilutum, Acidum Nitricum Dilutum, Acidum Nitro-hydrochloricum Dilutum, Acidum Phosphoricum Dilutum, and Acidum Sulphuricum Dilutum, will be seen to have nearly the same neutralising powers, measured, except in the case of dilute phosphoric acid, by the amount of an alkaline solution which they are capable of neutralising. Acidum Sulphuricum Aromaticum, which is really a dilute acid, is somewhat weaker; and Acidum Aceticum Dilutum has been so formed as to assimilate it closely in strength with Acetum, or vinegar. Acidum Hydrocyanicum Dilutum hardly belongs to the same category of medicines, as it is not employed on account of its acid properties.

Alkaloidea. Alkaloids. Many alkaloids are made official, as Aconitina, Atropina, Morphina, Quinina, Strychnina, &c.; the alkaloid is generally the chief active principle of the plant in which it is contained. Chemically these bodies are of considerable interest, and they are found to be analogues of ammonia. Most of the alkaloids contain carbon, oxygen, hydrogen, and nitrogen; some few, not official, though contained in official plants, contain carbon, hydrogen, and nitrogen only; such as Conina and Nicotina; these latter are liquid at ordinary temperatures. The methods of separating many of the alkaloids are given in the Pharmacopœia, but these differ so much from each other that no general rule can be laid down. The explanation of each process will be given under the particular alkaloid.

Aquæ. Waters. The waters of pharmacy consist of water holding in solution very small quantities of oils or other volatile principles. In the British Pharmacopœia two principal methods are adopted for making these preparations. In the first, the part of the plant is ordered to be placed with water in a retort, and a certain quantity of water brought over by distillation: this is the case with the dill, caraway, cinnamon, fennel, cherry-laurel, pimento, rose, and elder-flower waters.

The second method consists in distilling the volatile oils, previously obtained from the plants, with water; peppermint and spearmint waters are thus prepared.

Aqua Camphoræ, formerly termed Mistura Camphoræ, is made simply by allowing water to dissolve as much camphor as it is capable of taking up; Aqua Chloroformi is a very dilute solution of Chloroform in water; and Aqua Destillata is only water distilled with such precautions as to ensure its freedom from any appreciable or important amount of foreign matters.

Cataplasmata. Cataplasms or Poultices. Cataplasms are soft, moist, local applications, employed sometimes solely for the sake of their moisture and temperature, but more frequently, in addition to these properties, on account of certain peculiar active remedies contained in them.

The basis of the cataplasms in the British Pharmacopœia is linseed meal, either alone or united with bread or flour; boiling water is employed for mixing the ingredients, except in the case of Cataplasma Fermenti, when water at 100° F. (37°·8 C.) is made use of, in order that the catalytic powers of the ferment may not be injured by the heat. Olive oil is added to the Cataplasma Lini as a substitute for the natural oil which has been removed from the linseed by expression.

Confectiones. Confections, Electuaries, or Conserves. Confections are used sometimes merely as a basis for pill masses, &c., sometimes for the exhibition of sparingly soluble remedies which require to be administered in bulky doses. Honey or sugar, or both these substances, form a prominent part of all confections.

Decocta. Decoctions. A decoction is a watery solution of a medicinal substance prepared by boiling. The length of time ordered in the Pharmacopœia is in most instances from ten to twenty minutes; in some cases boiling for an hour is directed, and in one instance, Decoctum Granati Radicis, two pints are to be reduced to the bulk of a pint. The length of time should be proportionate to the solubility of the active matter of the drug; but prolonged boiling is often objectionable from rendering this portion less active, or even inert. In two decoctions only, viz.: Decoctum Aloes Compositum and Decoctum Sarsæ Compositum, are the preparations made compound by the introduction of more than one active drug. Only those medicines should be used in the form of decoction which contain active principles not injured by the boiling temperature; if volatile oils are present, they are dissipated in the process. Most decoctions should be strained when hot, as a deposit of active matters occasionally takes place when the preparation becomes cold.

All the decoctions are prepared from vegetable substances.

Essentiæ. Essences. There are two preparations under the above heading, Essence, in the British Pharmacopœia, viz., the Essence of Anise and of Peppermint, in each of which the volatile oil of the plant is dissolved in four parts by volume of Rectified Spirit,—hence the essences are only alcoholic solutions of the volatile oils. Many other essences are known in commerce, as the Essence of Almonds, for example.

Extracta. Extracts. Many kinds of extracts are found in the British Pharmacopœia.

1. Some consist of the fresh juice, reduced to the state of solid extract by evaporation: these are commonly termed fresh or green extracts, and are ordered to be prepared in the following manner. The juice obtained from the fruits of the plant, leaves and flowering tops, &c., is first heated to 130° F. (54°·4 C.), in order to coagulate the *green colouring matter*, filtered and heated to 200° F. (93°·3 C.),

at which temperature the *albumen* is coagulated. After being again filtered to remove the albumen, the juice is evaporated at a temperature not exceeding 140° F. (60° C.), to a consistence of a thin syrup, and the colouring matter, previously separated by the first coagulation, is added, and the whole evaporated to the proper consistence of an extract.

It will be observed, if the details of the process be examined, that the colour of a green extract is no test of its goodness, for the evaporation of the bulk of the juice may have been carried on at too high a temperature, and yet the product may preserve its green appearance, provided the last part of the process be carefully conducted.

The green extracts of the Pharmacopœia are Extractum Aconiti, Extractum Belladonnæ, Extractum Conii, Extractum Hyoscyami, and Extractum Lactucæ. Extractum Colchici and Extractum Taraxaci, are formed in a similar manner, with the exception that in the preparation of these extracts the temperature of the juice is at once raised to 212° F. (100° C.), to coagulate the albuminous matters, and the filtered juice afterwards reduced to the proper consistence at a temperature of 160° F. (71°·1 C.).

2. A second group of extracts is formed from the drugs in a dry state, by the action of cold or boiling distilled water, by which means all the matters soluble in this menstruum are dissolved, and the fluid afterwards reduced by evaporation to the proper consistence. In this manner the following extracts are prepared :—

Extractum Aloes Barbadensis, Extractum Aloes Socotrinæ, Extractum Anthemidis, Extractum Gentianæ, Extractum Glycyrrhizæ, Extractum Hæmatoxyli, Extractum Krameriæ, Extractum Opii, Extractum Pareiræ, and Extractum Quassiæ.

3. A third group is formed in a similar manner, except that the active matters are extracted by means of rectified or of dilute spirit, in place of water. This group consists of Extractum Belladonnæ Alcoholicum (first rectified spirit, then water), Extractum Calumbæ (proof spirit), Extractum Cannabis Indicæ (rectified spirit), Extractum Cascaræ Sagradæ (first proof spirit, then water), Extractum Colocynthidis Compositum (proof spirit), Extractum Gelsemii Alcoholicum (first rectified spirit, then water), Extractum Jaborandi (first proof spirit, then water), Extractum Jalapæ (first spirit, then water), Extractum Lupuli (spirit, then by boiling in water), Extractum Nucis Vomicæ (first rectified spirit, then water), Extractum Papaveris (first boiling water, then rectified

spirit), Extractum Physostigmatis (rectified spirit), Extractum Rhamni Frangulæ (proof spirit, and then water), Extractum Rhei (spirit and water), and Extractum Stramonii (proof spirit).

4. In the British Pharmacopœia liquid extracts are introduced; these preparations are made for the most part by macerating the drug in a large quantity of cold water, and extracting by this means such of the active matter as is soluble in this menstruum; afterwards evaporating the watery infusion, and, lastly, adding sufficient spirit to prevent decomposition.

In the Pharmacopœia the following liquid extracts are found: Extractum Belæ Liquidum, Extractum Cascaræ Sagradæ Liquidum, Extractum Cimicifugæ Liquidum, Extractum Cinchonæ Liquidum, Extractum Cocæ Liquidum, Extractum Ergotæ Liquidum, Extractum Filicis Liquidum, Extractum Glycyrrhizæ Liquidum, Extractum Opii Liquidum, Extractum Pareiræ Liquidum, Extractum Rhamni Frangulæ Liquidum, Extractum Sarsæ Liquidum, Extractum Taraxaci Liquidum.

In the case of the liquid extract of Ergot, each fluid part represents a solid part of the drug employed.

5. Ether is occasionally employed in lieu of water in the formation of the liquid extracts, especially when the drug contains much oleaginous matter. In the case of Extractum Stramonii it is used to free the preparation from the oil; in that of Extractum Filicis Liquidum it is employed as the solvent of the active matter.

6. Extractum Mezerei Æthereum is a solid extract prepared with rectified spirit and ether. In Extractum Colchici Aceticum the active principle of the corm is dissolved out by acetic acid.

Glycerina. Glycerines. There is a class of bodies introduced into the Pharmacopœia in which Glycerine forms the solvent menstruum; they are eight in number, and are formed by dissolving Carbolic, Gallic, and Tannic acids, Alum, Borax, Subacetate of Lead, Starch, and Tragacanth in Glycerine. The first three represent one part by weight of the active ingredient dissolved in four fluid parts of Glycerine. Glycerinum Amyli and Glycerinum Tragacanthæ are translucent jellies. It is probable that the members of this group act powerfully upon the part to which they are applied, as Glycerine mixes readily with aqueous fluids. Glycerine is a very powerful solvent of many substances sparingly soluble in water, as Arsenious acid, and some salts of the alkaloids.

Infusa. Infusions. There are a few points to be noticed under Infusions.

In the preparation of the majority of them, boiling distilled water is ordered, the time of infusing varying from ten minutes to four hours, according to the solubility of the active ingredients of the drugs ; in some few cases, as in those of the infusions of Chiretta and Cusparia, water at 120° F. (48°·9 C.) is made use of ; and in others, as the infusions of Calumba and Quassia, cold distilled water is employed. In the case of Calumba the use of cold water is of advantage, as the starch is not dissolved, and hence the infusion will keep much longer, and will not strike a blue colour in the presence of free iodine. The infusions of Quassia and Calumba are the only two official infusions which do not darken on the addition of persalts of iron.

Linimenta. Liniments, Embrocations. A liniment implies strictly a preparation capable of being used in anointing, and therefore of an oily or soapy nature. In the British Pharmacopœia the word is employed in a more extended sense, and includes most of the liquid pharmaceutic preparations which are employed as external remedies, and either rubbed or *painted* upon the part.

The majority of the liniments contain either a fixed or volatile oil or soap, camphor being regarded as a concrete volatile oil ; the exception is Linimentum Iodi ; which, unless united with other liniments or oily substances, is best used as a paint, for producing blistering or powerful counter-irritation.

Liquores. Solutions. These preparations are watery solutions, either of inorganic substances or of certain definite active organic principles, and should not be confused either with juices of plants (*succi*), or with liquid extracts : this error is frequently made.

It is important to remember certain points in regard to these preparations.

Those solutions which contain active drugs intended for internal use, contain one per cent. of the salt or alkaloid. This is the case with Liquor Arsenicalis, Liquor Arsenici Hydrochloricus, Liquor Sodii Arseniatis, Liquor Arsenii et Hydrargyri Iodi, Liquor Potassii Permanganatis, Liquor Atropinæ Sulphatis, Liquor Morphinæ Acetatis, Liquor Morphinæ Hydrochloratis, Liquor Strychninæ Hydrochloratis. The only important exceptions are Liquor Hydrargyri Perchloridi, which contains half a grain in the fluid ounce, and Liquor Morphinæ Bimeconatis, which contains one and a quarter per cent. Certain solutions, only used externally, are exceptions to the above rule, in that they are made with water; *e.g.*, Liquor Antimonii Chloridi, Liquor Hydrargyri Nitratis Acidus, Liquor Zinci Chloridi, Liquor Epispasticus, Liquor Gutta Percha.

Misturæ. Mixtures. The mixtures of the British Pharmacopœia for the most part consist of insoluble principles suspended in water by means of gummy or similar matters, which are either contained in the medicinal substances themselves, or added to the mixtures; examples of these two forms are seen in the Mixture of Ammoniacum and the Mixture of Guaiacum. Mistura Scammonii consists of Scammony Resin dissolved in milk. The Compound Senna Mixture and the Mistura Ferri Aromatica, are, however, notable exceptions, being merely watery infusions or solutions of the ingredients, with the addition of a little spirit:—the Senna Mixture is a form of aromatic black draught.

Mucilagines. Mucilages. These are watery preparations of certain substances, which are either wholly or in part soluble in water, forming peculiar semi-tenacious solutions of considerable service in pharmacy, from their power of suspending insoluble ingredients, or of binding them together in a mass. They are also of advantage in sheathing irritated surfaces, as inflamed mucous membranes.

Spiritus. Spirits. The spirits of the British Pharmacopœia made with volatile oils have a uniform strength, containing one fluid part of the oil to 49 fluid parts of rectified spirit. Of this composition are Spiritus Cajuputi, Spiritus Cinnamomi, Spiritus Juniperi, Spiritus Lavandulæ, Spiritus Menthæ Piperitæ, Spiritus Myristicæ, and Spiritus Rosmarini.

Spiritus Chloroformi contains only one fluid part of chloroform to nineteen fluid parts of rectified spirit, and is the correct name for the so-called chloric ether; Spiritus Camphoræ contains one part of camphor to nine parts of rectified spirit.

Spiritus Ætheris contains one fluid part of ether to two of rectified spirit. Spiritus Ætheris Compositus contains eight fluid ounces of ether, sixteen of rectified spirit, and three fluid drachms of a distillate obtained from a mixture of sulphuric acid and rectified spirit.

Succi. Juices. These preparations have been for some time used in medicine, and five are now made official; Succus Belladonnæ, Succus Conii, Succus Hyoscyami, Succus Scoparii, and

Succus Taraxaci. In each instance the expressed juice of the plant has one-third of its volume of rectified spirit added, a quantity found sufficient to preserve it from decomposition. The strength of these juices is liable to vary from the influence of situation, soil, and season upon the plant.

Suppositoria. Suppositories. Preparations introduced for the local application of certain drugs; they are eight in number, namely, carbolic acid with soap, tannic acid, tannic acid with soap, iodoform, morphine, morphine with soap, compound lead, and mercurial suppositories; these agents are ordered to be made up with oil of theobroma, or curd soap and glycerine of starch, and afterwards divided into cones.

Syrupi. Syrups. Fluid preparations, in which sugar forms an important ingredient, and gives a peculiar characteristic consistence to the liquid. Usually they are made use of on account of their sweetness, and to cover the flavour of drugs, but sometimes the sugar preserves the active ingredient from undergoing chemical change, as in the syrup of Iodide of Iron.

Tincturæ. Tinctures. In the British Pharmacopœia this group is very extensive, and it will be observed that in the preparation of the various tinctures, different menstrua are employed, as rectified spirit, proof spirit, compound spirit of ammonia, and spirit of ether.

Rectified Spirit is used whenever the active portion of the drug from which the tincture is made is of sparing solubility in more dilute alcohol. This is the case with some alkaloids, resinous and oily matters. In the Pharmacopœia, *rectified spirit* is used in the tinctures of Aconite, Arnica, Asafœtida, Benzoin, Indian Hemp, Capsicum, Chloroform, Chloroform and Morphine, Cinnamon, Cubebs, Acetate of Iron, Perchloride of Iron, Iodine, Kino, Larch, Lavender, Myrrh, Nux Vomica, ammoniated tincture of Opium, Podophyllum, Pyrethrum, Sumbul, Tolu, Veratrum Viride, Fresh Orange-peel, Ginger, and strong tincture of Ginger.

Aromatic Spirit of Ammonia is employed pharmaceutically with the same object as rectified spirit, namely, to dissolve resins and oily substances, but it is also used with a view to its own medicinal powers; its alkaline properties render it a potent solvent of resinous acids. It is only ordered for three tinctures, viz., Tinctura Guaiaci Ammoniata, Tinctura Valerianæ Ammoniata, and Tinctura Opii Ammoniata.

Spirit of Ether (a mixture of two parts by volume of rectified spirit and one part of ether) is used to form one tincture, Tinctura Lobeliæ Ætherea, and in this instance the antispasmodic virtues of the ether, rather than its solvent powers, have doubtless led to its employment.

Proof Spirit is used in making the remainder of the tinctures, containing matters partly soluble in water, partly in spirit; the amount of alcohol in proof spirit is more than sufficient to ensure an absence of all decomposition in the preparations, even when kept for a lengthened period.

Many of the tinctures made with rectified spirit, or with aromatic spirit of ammonia, become milky when added to water, on account of the precipitation of the resinous or oily matters, which are insoluble in water, and a species of emulsion is thus formed. Under these circumstances it is often desirable to have mucilage of acacia rubbed up with the tincture before the addition of the water, and by this means the insoluble matters are held in suspension for a long time.

Trochisci. Lozenges. There are twelve different lozenges; viz., of Benzoic Acid, Tannic Acid, Bismuth, Catechu, Reduced Iron, Ipecacuanha, Morphine, Morphine and Ipecacuanha, Opium, Chlorate of Potassium, Santonin, and Bicarbonate of Sodium, each with a definite amount of active ingredients.

Unguenta. Ointments. It will be observed that cerates are altogether omitted from the Pharmacopœia, but many of the present ointments contain wax, and are similar in character and composition to preparations formerly termed cerates.

In the ointments of the active principles of vegetables, as of Aconitine, Atropine, and Veratrine, eight grains of the active principle are contained in about an ounce of the preparation.

Vapores. Inhalations. Six of these preparations have been introduced into the Pharmacopœia, viz., Vapor Acidi Hydrocyanici, Vapor Chlori, Vapor Coninæ, Vapor Creasoti, Vapor Iodi, and Vapor Olei Pini Sylvestris. They are usually prepared just before they are used, the patient being made to breathe the volatile ingredients which are given out.

A suitable apparatus, or Inhaler, is necessary for their proper administration.

Vina. Wines. In these preparations sherry is used as the menstruum instead of rectified or proof spirit. They therefore contain much less alcohol than the tinctures, but sufficient to prevent decomposition of their active ingredients.

Attention to the following directions may prove of some value.

Care must be taken that medicines do not acquire any impurity from the material of the vessels in which they are either prepared or kept; therefore, unless otherwise ordered, glass, or vitrified ware, such as porcelain or stone, whose surface is not glazed with lead, should be employed.

All acid, alkaline, or metallic preparations, and salts of every kind, should be kept in stoppered glass bottles, and occasionally those made of green or black glass are desirable.

When the saturation of acids or alkalies is ordered, it is supposed that this is determined by the use of litmus or turmeric paper. In applying tests, distilled water should be made use of; and unless otherwise ordered, white bibulous paper should be employed.

In the filtration of liquids, or drying of crystals, degrees of heat are measured on the Fahrenheit or Centigrade scales: boiling heat is 212° F. (100° C.); a gentle heat between 90° F. and 100° F. (32°·2 C. and 37°·8 C.). Specific gravities are to be taken at the temperature of 60° F. (15°·5 C.). In ascertaining the weight of any precipitate, the precipitant should be added in excess, and the precipitate well washed, and afterwards dried at 212° F. (100° C.); care, however, is sometimes necessary, in order that the precipitate be not redissolved by the excess of the precipitant.

Crucibles should be made of Hessian or Cornish ware.

Exposure to hot water, or the vapour of boiling water, in a proper vessel, constitutes a *Water Bath.*

A *Sand Bath* consists of sand heated in a suitable vessel.

Symbols and Equivalent Weights of the Elementary Bodies mentioned in the British Pharmacopœia.

ELEMENTARY BODIES.	SYMBOLS AND ATOMIC WEIGHTS.
Aluminium	**Al** = 27
Antimony (Stibium)	**Sb** = 120
Arsenium	**As** = 75
Barium	**Ba** = 137
Bismuth	**Bi** = 209
Boron	**B** = 11
Bromine	**Br** = 80
Calcium	**Ca** = 40
Carbon	**C** = 12
Cerium	**Ce** = 141
Chlorine	**Cl** = 35·5
Chromium	**Cr** = 52·5
Copper (Cuprum)	**Cu** = 63·4
Gold (Aurum)	**Au** = 196·5
Hydrogen	**H** = 1
Iodine	**I** = 127
Iron (Ferrum)	**Fe** = 56
Lead (Plumbum)	**Pb** = 207
Lithium	**L** = 7
Magnesium	**Mg** = 24
Manganese	**Mn** = 55
Mercury (Hydrargyrum)	**Hg** = 200
Nitrogen	**N** = 14
Oxygen	**O** = 16
Phosphorus	**P** = 31
Platinum	**Pt** = 195
Potassium (Kalium)	**K** = 39
Silver (Argentum)	**Ag** = 108
Sodium (Natrium)	**Na** = 23
Sulphur	**S** = 32
Tin (Stannum)	**Sn** = 118
Zinc	**Zn** = 65

LEEDS SCHOOL OF MEDICINE

INORGANIC SUBSTANCES.

OXYGEN.

(0. Eq. = 16.)

A COLOURLESS, odourless gas; exists mixed with nitrogen in atmospheric air, and, in chemical combination with hydrogen, in water. Usually prepared by heating chlorate of potash:

$$KClO_3 = KCl + O_3.$$

A peculiar modification of oxygen, known as ozone, is a powerful oxidising agent; it liberates iodine from its metallic combinations, converts protosalts of manganese into persalts, and sulphide of lead into sulphate.

Therapeutics. Inhalation of oxygen has been recommended in cases of deficient aëration of the blood, but its use has not been attended with much success.

The inhalation of an atmosphere highly charged with ozone reduces the frequency of the respiratory and cardiac movements, irritates the mucous lining of the air-passages, and renders the blood venous. This last phenomenon is possibly due to interference with diffusion of carbonic acid from the blood, owing to the density of ozone being slightly higher than that of carbonic acid.

NITROGEN.

(N. Eq. = 14.)

Nitrites and nitrates, obtained from the oxides N_2O_3 and N_2O_5, are much used in medicine. Nitrogen forms ammonia in combination with hydrogen; with carbon it forms cyanogen, and it enters largely into the composition of all alkaloids. It is rarely employed in its free state as a therapeutic agent; it has been used, however, to produce anæsthesia, causing asphyxia from the absence of oxygen.

HYDROGEN.

(H. Eq.=1.)

Hydrogen combines with oxygen to form water (H_2O) and peroxide of hydrogen (H_2O_2), an unstable liquid of syrupy consistence.

Peroxide of hydrogen possesses powerful oxidising properties; it whitens the tongue, and is supposed to possess some stimulant and disinfecting properties. It has been said to be of service in bronchitis, pertussis and struma.

CARBON.

(C. Eq.=12.)

An elementary body found pure, or almost so, in the diamond, plumbago, and anthracite; combined with other elements, it enters into almost all vegetable and animal substances. In medicine it is now only employed in the form of charcoal, of which there are two varieties, vegetable and animal.

CARBO LIGNI. Wood Charcoal. Wood charred by exposure to a red heat without access of air.

Prep. Obtained by burning wood with a limited supply of air, by which the hydrogen, &c., are burnt off, and the carbon remains. Wood yields from seventeen to twenty-three per cent. It is met with either in the form of the pieces of wood from which it was made, or as a black powder.

Prop. It is odourless and almost tasteless; when dry it possesses the power of absorbing gases and odours to a great extent, especially if recently prepared; besides carbon, it contains some salts, about 2 per cent. It is insoluble in water, and in close vessels is neither melted nor volatilised by the most intense heat.

Off. Prep. **Cataplasma Carbonis.** *Charcoal Poultice.* (Wood charcoal, in powder, half an ounce; bread, two ounces; linseed meal, one ounce and a half; boiling water, ten fluid ounces. Mix the water, bread and linseed; then add half the charcoal and sprinkle the remainder on the surface.)

Therapeutics. Wood charcoal has been employed on account of its absorbing power, as an antiseptic and corrector of acidity and flatus of the stomach and intestines, and to correct the state of the fæces in some diseases. Patients suffering from organic disease of the stomach often find considerable temporary relief from the use of wood charcoal, although it can have no curative effect in such cases: in functional affections of the alimentary canal it is likewise useful, especially when these are accompanied with much flatus and acidity. As an external application it is used in the form of powder or of poultice, to prevent the fœtor of ulcers, &c. Dr. Stenhouse has proposed its use in the manufacture of respirators for those who are subjected to the influence of injurious gases or vapors. Wood Charcoal is also used as a dentifrice.

Dose. Internally from a teaspoonful to a tablespoonful, recently made, and carefully preserved in stoppered vessels. It is sometimes made into biscuits (Bragg's biscuits) and thus employed; sometimes also it is given in the form of lozenges.

CARBO ANIMALIS. Animal Charcoal. Bone Black.

The residue of bones which have been exposed to a red heat without the access of air, reduced to powder: it contains about 10 per cent. of carbon, the remaining 90 per cent. consisting of phosphate with a little carbonate of calcium.

CARBO ANIMALIS PURIFICATUS. Purified Animal Charcoal. Bone black, deprived of its earthy salts.

Prep. It is prepared by treating bone black with very dilute hydrochloric acid for two days, at a moderate heat to remove all the salts; then washing and drying, and afterwards heating to redness in a covered crucible.

Prop. A black, pulverulent substance, inodorous and almost tasteless; absorbs gases and odours, and has also great power in abstracting almost all principles from their solutions, such as alkaloids, bitter and colouring matters, &c. Tincture of litmus, diluted with twenty times its bulk of water, agitated with it and then filtered, passes through colourless. When burned at a high temperature, with a little red oxide of mercury and free access of air, it leaves a very slight residue.

Therapeutics. Animal charcoal may be used in the same way and for the same purposes as vegetable, in addition to which the author has shown that its antidotal power against vegetable poisons is very great, rendering inert opium, nux vomica, aconite, and almost all the active organic poisons; this property has no relation to its mechanical condition, or mere state of insoluble powder, as has been thought by some, for the gastric juice does not appear to have the power of separating the poison from the charcoal when the combination is introduced into the stomach.

In pharmacy animal charcoal is used to deprive alkaloids and other principles of their colour, &c.

Dose. As an antacid and corrector of fœtor, from a tea-spoonful to a tablespoonful; as an antidote, from half an ounce to two ounces or more, according to the amount of poison taken; it may be suspended in water for a short time, and thus administered. Common bone black in the state of fine powder may be used as an antidote or externally applied; it is much more powerful than the purified charcoal, if estimated by the amount of contained carbon.

SULPHUR.

(S. Eq. = 32.)

An elementary body found native as virgin sulphur; also in combination, as sulphides or sulphurets of metals, &c.

SULPHUR SUBLIMATUM. Sublimed Sulphur; Flowers of Sulphur.

SULPHUR PRÆCIPITATUM. Precipitated Sulphur; Lac Sulphuris; Milk of Sulphur.

Prep. *Sublimed* sulphur is generally prepared from the virgin sulphur, by causing it to rise in vapour, which is condensed in a chamber. It may also be made from any metallic sulphide, but is then more liable to contain impurities, as arsenic, &c. The *precipitated* sulphur is directed in the Pharmacopœia to be prepared by boiling five ounces of sublimed sulphur and three ounces of slaked lime in a pint and a half of water, when calcium pentasulphide (CaS_5), and calcium hyposulphite ($CaS_2H_2O_4$) are formed, as shown in the following equation: $3CaH_2O_2 + 12S = 2CaS_5 + CaS_2H_2O_4 + 2H_2O$. The addition of hydrochloric acid to the filtered solution throws down a precipitate of sulphur, which is washed with distilled water until the washings cease to have an acid reaction or precipitate with oxalate of ammonium; showing that the acid and lime have been removed. The sulphur should be dried at a temperature not exceeding 120° F. (48°·9 C.).

Prop. *Sublimed* sulphur is a citron or bright yellow-coloured gritty powder, without taste or odour, sp. gr. 1·98; it is entirely volatilised by heat, is soluble in hot oil of turpentine and bisulphide of carbon, and to a small extent in fixed oils. It burns with a blue flame, and the formation of sulphurous acid. It does not redden moistened litmus paper, showing that it is not oxidised. Solution of ammonia, agitated with it and filtered, does not on evaporation leave any residue (showing freedom from orpiment, $\mathbf{As_2S_3}$). *Precipitated* sulphur forms a pale yellow powder, free from grittiness; in other respects it resembles sublimed sulphur; neither should give an acid reaction to water. The composition of both kinds of sulphur is the same. When heated to a certain point sulphur assumes a peculiar viscid condition.

Off. Prep. Of sublimed sulphur.
Confectio Sulphuris. *Confection of Sulphur.* (Sublimed sulphur, four ounces; acid tartrate of potassium, in powder, one ounce; syrup of orange peel, four fluid ounces; tragacanth, in powder, eighteen grains.)

Unguentum Sulphuris. *Ointment of Sulphur.* (Sublimed sulphur, one ounce; benzoated lard, four ounces.)

Sulphur is also contained in emplastrum hydrargyri, emplastrum ammoniaci cum hydrargyro, and pulvis glycyrrhizæ compositus.

Under the name of *Compound Sulphur Lozenges* the author has recently used with much advantage and convenience a lozenge, containing five grains of precipitated sulphur with one grain of acid tartrate of potassium.

Therapeutics. In small doses sulphur is absorbed into the blood, and acts as a stimulant to the skin and different mucous membranes, partly passing off from the skin as sulphuretted hydrogen, and partly from the kidneys, in an oxidised state, as a sulphate, which can be detected in the urine; probably a small portion is eliminated by the breath in the form of sulphuretted hydrogen. Silver worn on the person of patients taking sulphur becomes blackened. In larger doses it produces a laxative or very mild purgative effect upon the bowels. Externally it is a slight stimulant, and has the power of destroying the *acarus scabiei* or itch insect, and all the vegetable parasites that infest the skin.

Sulphur is given as a stimulant in chronic cutaneous diseases, as impetigo, prurigo; also in chronic bronchitis, when it acts as a stimulating expectorant; it is also useful in rheumatoid arthritis; as a laxative it is given to children and delicate persons; likewise in diseases of the rectum, as piles. Sulphur is a valuable remedy in mercurial ptyalism. Externally it is applied as an ointment in skin affections, especially scabies and vegetable parasitic diseases.

Dose. Of either form of Sulphur. As a stimulant, from 5 gr. to 10 gr. and upwards. As a laxative, 30 gr. to 60 gr. or more. Of confection, 60 gr. to 120 gr. Formerly sulphur dissolved in olive oil, called balsam of sulphur, was a favourite remedy.

Adulteration. Sublimed sulphur may contain a trace of sulphurous acid from oxidation and absorption of moisture during sublimation; it should, however, be free from this, and not redden moistened litmus paper; and a solution of ammonia which has been agitated with it should not leave any residue; when washed it is called *sulphur lotum.* The precipitated sulphur formerly contained from 50 to 70 per cent. of sulphate of calcium, arising from sulphuric acid being used to precipitate it; this impurity can be detected by its not subliming with heat; precipitated sulphur when pure does not show any crystals under the microscope, but simply opaque globules.

PHOSPHORUS.

(P. Eq. = 31.)

PHOSPHORUS. Phosphorus.

Prep. From phosphoric acid or superphosphate of calcium (made by acting upon bone ashes with oil of vitriol) by distillation with charcoal, when carbonic oxide is formed and phosphorus set free, which sublimes.

Prop. A waxy-looking substance, which emits white fumes on exposure to the air, and is usually in the form of sticks, from being cast into moulds; it is almost colourless and transparent when fresh, luminous in the dark, from oxidation and the formation of phosphorous anhydride ($\mathbf{P_2O_3}$), very easily inflamed; sp. gr. 1·77; melts at 110° F. (43°·3 C.); insoluble in water; soluble in ether, oils, and true naphtha; entirely soluble in boiling oil of turpentine and bisulphide of carbon. It burns with a bright flame, producing dense fumes of phosphoric anhydride ($\mathbf{P_2O_5}$); becomes opaque and reddish on the surface when old, from the formation of a suboxide, to prevent which it should be kept in water and in the dark. Phosphorus also exists in a peculiar allotropic condition, known as amorphous or red phosphorus, in the form of a red powder, which may be exposed to the air without giving off any fumes, and may be heated in the open air till the temperature reaches 500° F. (260° C.), at which point it takes fire. This variety is not soluble in bisulphide of carbon.

Off. Prep. **Oleum Phosphoratum.** *Phosphorated Oil.* Take of phosphorus and oil of almonds, of each a sufficiency. Heat the oil to about 300° F. (149° C.), and keep it at this temperature for fifteen minutes; cool, and filter. Put four fluid ounces of this oil with sixteen grains of phosphorus into a stoppered bottle, immerse the bottle in hot water until the oil has acquired a temperature of 180° F. (82°·2 C.), and shake till the phosphorus is entirely dissolved. The resulting product should be clear and straw-coloured; phosphorescent in the dark. The oil of almonds is heated in the first place, to destroy certain organic impurities which, unless removed, would cause the gradual deposition of the phosphorus. The preparation contains about one per cent. of phosphorus.

Pilula Phosphori. *Phosphorus Pill.* (Phosphorus, three grains; Balsam of Tolu, one hundred and twenty grains; yellow wax, fifty-seven grains; curd soap, ninety grains.) Rub the phosphorus with the balsam of Tolu under water, kept at 140° F. (60° C.), till no particles of phosphorus are visible. Then add the wax, and as it softens, mix it thoroughly with the other ingredients. Allow the mass to cool, without exposure to the air, and keep it in a bottle immersed in cold water. Add one grain of the soap to every two grains of the product, and soften the mass with a few drops of rectified spirit when it is made into pills. Three grains of the pill contain $\frac{1}{30}$ gr. of phosphorus.

Therapeutics. In poisonous doses, phosphorus causes symptoms resembling those of acute atrophy of the liver, such as jaundice, vomiting, hæmorrhages, &c. After death, fatty metamorphosis of the liver, muscles, and other organs, is found. Even in medicinal doses, dangerous symptoms may be caused by the drug. Dr. Anstie records a case in which doses of $\frac{1}{30}$ gr. in pills caused burning pain at the epigastrium and hæmaturia. Introduced under the skin of an animal, phosphorus causes no local irritation. The fumes of phosphorus produce on individuals exposed to them for a lengthened period, a peculiar disease, necrosis of the jaw-bone, probably from phosphorous anhydride being present; this disease was more common thirty years since than at present, before the amorphous form of phosphorus was employed in manufactures.

Phosphorus is said to act as a powerful stimulant and aphrodisiac. It has been employed on the Continent in low fevers, cholera, &c., and in this country in the treatment of phthisis, but without much good effect. Its chemical analogy with arsenic has led to its administration in cases of intercostal and trigeminal neuralgia, occasionally with striking results; it has been used for headaches resulting from too prolonged mental occupation; also in psoriasis and eczema. It has also been employed in the treatment of goitre.

Dose. Of phosphorated oil, 5 min. to 10 min.; it is best given in the form of capsules after meals. Of phosphorus pill, 2 gr. to 4 gr.

See also Calcii Hypophosphis and Sodii Hypophosphis

IODINE.

(I. Eq. = 127.)

IODUM. Iodine. Iodine, in crystals (so named from ἰωδης, violet).

Prep. Iodine is prepared from kelp, the vitrified ashes of sea-wrack, found in the Western Islands, north of Scotland and Ireland ; from the solution of this substance, after the crystallisation of most of the salts, as the carbonate of sodium, &c., a liquor remains, containing the iodides of sodium, potassium, magnesium, &c. ; this, when treated with sulphuric acid, gives off carbonic acid, sulphurous acid, and sulphuretted hydrogen, while sulphate of sodium, mixed with free sulphur, crystallises out ; then to the still acid solution there is added peroxide of manganese, the whole is heated, and the iodine which sublimes is collected in receivers. The last decomposition may be thus represented, sulphates of sodium and manganese remaining in the retort :

$$2NaI + MnO_2 + 2H_2SO_4 = Na_2SO_4 + MnSO_4 + 2H_2O + I_2.$$

Prop. Black scales, or laminar crystals, with metallic lustre, sp. gr. 4·95, odour similar to chlorine, melts when heated, then sublimes in a beautiful violet vapour without leaving any residue ; slender colourless crystals, with a pungent odour, should not be sublimed in the early part of the process, showing the absence of iodide of cyanogen. Soluble in rectified spirit and ether, but slightly so in pure water ; much more soluble in a watery solution of iodide of potassium and chloride of sodium. The aqueous solutions precipitate starch of a dark-blue colour. In free alkaline solutions iodine dissolves and forms iodides and iodates.

Off. Prep. **Linimentum Iodi.** *Liniment of Iodine.* (Iodine, one ounce and a quarter ; iodide of potassium, half an ounce ; glycerine, a quarter of an ounce ; rectified spirit, ten fluid ounces.)

Liquor Iodi. *Solution of Iodine.* (Iodine, twenty-two grains ; iodide of potassium, thirty-three grains ; water, a fluid ounce.)

Tinctura Iodi. *Tincture of Iodine.* (Iodine, half an ounce ; iodide of potassium, a quarter of an ounce ; rectified spirit, twenty fluid ounces.)

Unguentum Iodi. *Ointment of Iodine.* (Iodine, thirty-two grains ; iodide of potassium, thirty-two grains ; glycerine, one fluid drachm ; prepared lard, two ounces.)

Vapor Iodi. *Inhalation of Iodine.* (Tincture of iodine, one fluid drachm ; water, one fluid ounce. Mix.) Heat slightly, and inhale the rising vapour.

Therapeutics. When applied externally, free iodine acts as an irritant, or vesicant, according to the mode of using it ; and when rubbed in for some time, it is absorbed, and influences the neighbouring parts, and also the system at large; when the diluted vapour is inhaled, it acts topically on the mucous membrane of the respiratory passages. Internally, free iodine produces irritation of the mucous membrane of the alimentary canal, causing, in large doses, heat and pain at the epigastrium, and vomiting; so that the amount of the element capable of being thus administered is very limited. When the full influence of iodine upon the system is desirable, the drug is usually given in combination, more especially as iodide of potassium, a salt which produces but little local irritation. Iodine, either free or combined, is rapidly absorbed into the blood, and can be detected in many of the secretions, especially in the urine; the constitutional effects produced are increased activity of most of the secreting and excreting organs, as the kidneys, mucous membranes, and skin; it also powerfully influences the glandular and absorbent systems, a fact which is observed when such parts are enlarged, as in bronchocele, and in scrofulous glands of the neck and abdomen; iodine is stated occasionally to cause the wasting of even healthy glands, as the breasts and testes. Iodine has a powerful alterative action, as exhibited in its influence over scrofulous affections and tertiary syphilis. When given in large medicinal doses, the mucous membranes of the nose, frontal sinus, eyes, pharynx, often become much irritated, and catarrhal symptoms, coryza, &c., are induced; occasionally much depression ensues from its administration, accompanied by a low febrile state of system.

Iodine and iodide of potassium are administered in very many diseases, as the different forms of scrofula, bronchocele and other glandular enlargements, hypertrophy and induration of organs or other structures, produced by inflammation, as, *e.g.*, hypertrophy of the spleen, liver, uterus, &c.; in chronic skin affections, syphilitic or not; for the relief of other tertiary syphilitic symptoms, such as nodes, ulcers, gummata, &c., and also in chronic forms of rheumatism and gout; in dropsies as a diuretic; in some forms of amenorrhœa, as an emmenagogue; and in various obstinate mucous discharges, as leucorrhœa, as an alterative. The author, from long clinical experience, feels quite assured that small doses of free iodine in some chronic joint affections, act much more efficaciously than iodide of potassium.

Externally iodine is used in chronic skin diseases and over enlarged and indurated parts, and diseased joints, to alter action or cause absorption, or as a parasiticide; for this purpose it may be applied in the form of the liniment, solution, tincture, or ointment. As a speedy vesicant, the liniment may be painted over the part two or three times; one application, however, is sometimes sufficient. Vapor iodi may be used as an inhalation in some forms of chronic bronchitis and phthisis. (*See* Iodide of Potassium.)

Dose. Of the tincture of iodine, 5 min. to 20 min.

Adulteration. Water is often present, also iodide of cyanogen; besides these, fixed impurities, as plumbago, black oxide of manganese, charcoal, iron, &c. The first two are volatile; water can be detected by finding whether bibulous paper is moistened by the iodine; iodide of cyanogen by distilling at a very low temperature, when this salt sublimes in white crystalline needles before the iodine comes over; the fixed impurities are left after sublimation. The Pharmacopœia gives the following quantitative test: 12·7 grains, dissolved in an ounce of water containing 15 grains of iodide of potassium, require for complete decoloration 1000 grain-measures of the volumetric solution of hyposulphite of sodium. In this process, iodide of sodium (**NaI**), which is colourless, and also tetrathionate of sodium ($Na_2S_4O_6$), are formed. The following formula will serve to illustrate the changes which occur: $2Na_2S_2O_3+I_2=2NaI+Na_2S_4O_6$.

SULPHURIS IODIDUM. Iodide of Sulphur. SI_2.

Prep. (Sulphur, one ounce; iodine, four ounces. Rub them together in a wedgwood mortar, put them into a flask, heat gently till the mass is uniformly dark, then increase the heat to produce liquefaction. Cool, and then remove the mass by breaking the flask, reduce it to pieces, and keep in a well-stoppered bottle.)

Prop. A greyish-black crystalline metallic-looking substance, not unlike sulphide of antimony in appearance, having the odour of iodine, and staining the skin yellow. Soluble in about sixty parts of glycerine; insoluble in water, but decomposed when boiled with it, and, if properly prepared, should give, when so boiled, 20 per cent. residue of sulphur.

Off. Prep. **Unguentum Sulphuris Iodidi.** *Ointment of Iodide of Sulphur.* (Iodide of sulphur, thirty grains; hard paraffin, a quarter of an ounce; soft paraffin, three quarters of an ounce.)

Therapeutics. Applied externally in the form of an ointment, it acts in a manner very similar to iodine, and has been employed in some obstinate chronic skin diseases, as lepra, acne indurata, &c. Internally it possesses no particular value, but has occasionally been given as an alterative.

Dose. ½ gr. to 2 gr. or more.

BROMINE.

(Br. Eq. =80.)

BROMUM, Bromine (so named from Βρωμος, a stench). An elementary body contained in combination with metals in sea water and sea plants.

Prep. From bittern, the liquor left from sea water, after the crystallisation of common salt; it is present as bromide of magnesium, and can be obtained by passing a current of chlorine gas through the liquor, which unites with the magnesium, and liberates the bromine; this is taken up by shaking with ether, which dissolves the bromine, and rises with it to the surface. Subsequent purification is required, usually effected by converting the bromine into bromide of potassium, and again liberating the bromine by means of manganese dioxide and sulphuric acid.

$$2KBr + MnO_2 + 2H_2SO_4 = K_2SO_4 + MnSO_4 + 2H_2O + Br_2.$$

Prop. A dark brownish-red liquid by reflected, but hyacinth-red by transmitted light through thin layers; of an intensely disagreeable acrid odour and taste, very volatile. At the common temperature of the air it gives off red fumes, and it boils at 135° to 145° F. (57°·2 to 62°·8 C.). Agitated with solution of soda in such proportion that the fluid remains very slightly alkaline, it forms a colourless liquid, which if coloured by a further addition of a little bromine, does not become blue on the subsequent addition of a cold solution of starch, showing the absence of iodine, as bromine precipitates starch of an orange colour; sp. gr. 2·97 to 3·14; soluble in ether, alcohol, and slightly in water.

Therapeutics. Bromine in a free state is only employed as a caustic. Its vapour is powerfully irritating, and the odour so offensive as to render its use almost impracticable, even if it were desirable to exhibit it in this form; dissolved in water it has sometimes been applied externally, but with no marked advantage over other remedies, such as iodine.

In combination bromine is very largely employed, especially in the form of bromide of potassium and bromide of ammonium.

Bromide of potassium was first used for the purpose of causing absorption of the products of inflammation, &c., as in cases of enlarged spleen and hypertrophied liver. About the year 1854, the author made somewhat extensive trials of it, in cases of syphilitic skin disease, in patients who were found to be intolerant of the action of iodine. In these trials he found that it caused much drowsiness, and in very large doses, want of power over the extremities; he also was informed by several patients that it had a great effect upon the sexual functions, acting as an antaphrodisiac, causing loss of virile power, and diminished venereal desire. Its prolonged administration often causes an eruption of acne. In 1857, Sir Charles Locock showed its efficacy in epilepsy connected with hysteria, and in nymphomania. Previously to these dates it had been stated to produce anæsthesia of the palate and fauces. Experimental enquiries as to the physiological action of the salt have led to the most contradictory results. In fact it is still undecided how far its sedative effect on the nerve-centres, and its depressant action on the heart, are due to bromine, and how far to the alkali-metal with which the bromine is combined. The value of the drug may thus be said to rest solely upon clinical evidence. Bromide of potassium never gives rise to any of the symptoms which the iodide is so apt to produce, namely, coryza, sore throat, and the peculiar metallic taste in the mouth; when such occur during its exhibition, the adulteration of the bromide with iodide may be suspected, a circumstance which the author, many years since, showed to be very common, though not often intentional.

Bromide of potassium may be employed for many purposes:—

1st. For its alterative effects, as in skin affections connected with syphilis, especially when patients cannot bear the exhibition of iodine; also to cause the removal of glandular swellings, and in enlarged spleen; in fact it possesses some of the alterative powers of the iodides, but is less powerful.

2nd. This remedial agent has been very extensively used in diseases of the nervous system, and it is undoubtedly of great value in these affections.

a. As a soporific in some forms of sleeplessness, occurring after acute disease, and when opium causes excitement, and henbane or belladonna fail to induce sleep. It is still a desideratum to discover the exact form of sleeplessness which is relieved by this remedy.

b. In convulsive nervous affections, as chorea and epilepsy, hysteria, laryngismus stridulus, spasmodic asthma. In many cases of epilepsy it has been found of the greatest value, diminishing the frequency of the attacks, and sometimes even arresting them altogether; in epileptiform convulsions connected with hysteria it often acts as a specific.

c. In the agitation of delirium tremens, and the analogous state which sometimes occurs during the course of the specific fevers, the bromide has proved very useful.

d. It is also of much value in the treatment of affections of the generative organs, and acts probably in such cases through its influence on the nervous system ; thus, in many cases of troublesome priapism it proves completely effectual, as also in nymphomania ; it is likewise useful in menorrhagia ; more especially when this occurs at the period when the cessation of the catamenia is approaching.

3rd. Bromide of potassium has also been proposed as a remedy in the treatment of many other diseases, as of the throat and larynx ; and Sir James Simpson and Dr. Begbie have asserted that this salt has considerable power in checking the formation of sugar in saccharine diabetes.

Dose. Of bromide of potassium, 5 gr. to 30 gr. ; of bromide of ammonium, 2 gr. to 20 gr.

Adulteration. Bromine sometimes contains iodine, which is readily detected by the tests for the latter element.

CHLORINE.

(Cl. Eq. = 35·5.)

Free chlorine occurs in the form of a greenish-coloured gas, having a peculiar acrid odour, very soluble in water, especially when cold ; it possesses intense chemical powers in presence of moisture, bleaching all vegetable colours and acting as a powerful disinfectant, probably by decomposing the organic particles producing disease. For this purpose it can be evolved from chlorinated lime by the addition of some acid. It is ordered in the Pharmacopœia to be prepared by taking of hydrochloric acid, six fluid ounces ; black oxide of manganese, in fine powder, an ounce ; and water, a sufficiency. Put the oxide of manganese into a gas bottle, pour on the hydrochloric acid, diluted with two ounces of water, and apply a gentle heat, and by suitable tubes cause the liberated gas to pass through two ounces of water in a wash-bottle, when it is fit for use ; the decomposition may be represented thus :

$$4HCl + MnO_2 = MnCl_2 + 2H_2O + Cl_2.$$

LIQUOR CHLORI. Solution of Chlorine. Chlorine gas dissolved in water.

Prep. (By preparing chlorine as above, passing the washed gas, as long as it continues to be given off, to the bottom of a three-pint bottle containing thirty ounces of water.)

Prop. It is a liquid, having a slight green colour, with a very strong odour of chlorine, and immediately discharging the colour of a dilute solution of sulphate of indigo ; when exposed to the light it is decomposed, with the formation of hydrochloric acid and oxygen, and hence should be used recently prepared. Sp. gr. 1·003, leaves no residue on evaporation. When 20 grains of iodide of potassium, dissolved in an ounce of distilled water, are added to a fluid ounce of this preparation, the mixed solution acquires a deep red colour (from the liberation of iodine), which requires for its discharge 750 grain-measures of the volumetric solution of hyposulphite of sodium, equivalent to 2·66 grains of chlorine.

Off. Prep. **Vapor Chlori.** *Inhalation of Chlorine.* (Take of chlorinated lime, 2 ounces ; cold water, a sufficiency ; put the powder into a suitable apparatus, moisten it with the water, and let the vapour which arises be inhaled.)

Use. The vapour of chlorine is employed when we wish for the local action of chlorine upon the mucous membranes of the mouth and fauces, and likewise upon the lining of the bronchial tubes.

Therapeutics. Free chlorine in the form of vapour acts as a powerful stimulant or irritant, according to its state of dilution, upon any part with which it comes in contact ; and it has been thus used in the treatment of chronic bronchitis and phthisis, and in some forms of pulmonary abscess accompanied with fœtid expectoration ; it may also be employed in chronic laryngeal affections. In some of these diseases it has appeared to be serviceable, but recent observations have not shown that it possesses any real influence in checking the progress or development of tubercle in the lungs.

When dissolved in water as liquor chlori, it may be used either to produce its topical effects, or on account of its remote or constitutional effects after absorption into the blood. Topically, when the solution is much diluted, it is used as a gargle, in various diseases of the mouth, as in ptyalism, cancrum oris, aphthæ; in ulceration of the tonsils, such as occurs in scarlatina, diphtheria, &c.

As a lotion, to cancerous and other foul ulcers of any part, and also in some skin diseases.

The effects after absorption have not been clearly made out; it is supposed to possess some alterative and antiseptic action, especially influencing the function of the liver, and the chlorine vapour bath has been used for this influence upon the system, as likewise sponging with the solution of chlorine; probably liquor chlori acts in a manner similar to the nitro-hydrochloric acid, in which mixture of acids, a body, not unlike free chlorine in its action, is slowly developed. (See Liquor Sodæ Chlorinatæ.)

Chlorine when united to the metals, as in common salt, produces no very specific action upon the animal economy; the fact that the chlorides are essential components of the blood and other fluids of the body may explain their little power when given as medicines. (*See* Sodii Chloridum.)

Dose. 10 min. to 30 min. freely diluted.

WATER.

AQUA. Water.

Natural water (**H_2O**), the purest that can be obtained, cleared if necessary by filtration; free from odour, taste, and visible impurity. If pure it leaves no residue when evaporated, but it is very difficult to ensure absolute purity.

To be used whenever "water" is ordered in the British pharmacopœia. In dispensing prescriptions, *aqua* should be understood to mean distilled water.

Off. Prep. **Aqua Destillata.** *Distilled Water.* **H_2O.**

Prep. Made by distilling water in a still, rejecting the first portion.

Prop. & Comp. A limpid colourless fluid, devoid of taste and smell, not altered by the addition of lime-water, chloride of barium, nitrate of silver, oxalate of ammonium, or sulphuretted hydrogen, indicating freedom from carbonic acid or carbonates, sulphates, chlorides, and most organic matter, lime, and ordinary metallic impurities, as copper, lead, &c.

Use. It is ordered to be used in making almost all pharmaceutical preparations, but common water is frequently substituted; in some cases this neglect is important, as insoluble and inert compounds are formed, and the solvent power of distilled water for some substances exceeds that of common water.

MINERAL WATERS.

See Appendix.

ACIDS.

ACIDS EMPLOYED IN MEDICINE OR FOR TESTS, ARRANGED ALPHABETICALLY.

ACIDUM ACETICUM. Acetic Acid. An acid liquid, prepared from wood by destructive distillation; 100 parts by weight contain 33 parts of real acetic acid, $\mathbf{HC_2H_3O_2}$.

Prep. When wood is heated in close vessels as in iron retorts, amongst the volatile products of its destruction, a large amount of acetic acid distils over, mixed with wood spirit and various hydrocarbons; from this fluid, after redistillation, and neutralisation with carbonate of sodium, acetate of sodium is separated by crystallisation, and purified by several re-crystallisations; this salt, heated with sulphuric acid and water, yields acetic acid mixed with water, and forms the product under consideration.

Prop. A colourless liquid with a very pungent odour and strong acid taste, sp. gr. 1·044. It is volatile, and leaves no residue when evaporated. 182 gr. require for neutralisation 1000 measures of the volumetric solution of soda. It gives no precipitate with sulphuretted hydrogen, chloride of barium, or nitrate of silver. These tests indicate a freedom from metallic impurities, sulphuric or hydrochloric acids. If a fluid drachm of it, mixed with half an ounce of distilled water, and half a drachm of pure hydrochloric acid, be put into a flask with a few pieces of granulated zinc, and, while the effervescence continues, a slip of blotting paper, wetted with a solution of subacetate of lead, be suspended in the upper part of the flask, above the liquid, for about five minutes, the paper will not become discoloured, showing the absence of sulphurous acid, which would thus produce sulphuretted hydrogen and decompose the subacetate.

Off. Prep. **Acidum Aceticum Dilutum.** *Dilute Acetic Acid.* (Acetic acid, one pint; distilled water, seven pints.)

The sp. gr. is 1·006. One fluid ounce requires for neutralisation 313 grain-measures of the volumetric solution of soda, corresponding to 4·27 per cent. of real acetic acid; one fluid ounce therefore corresponds to nearly nineteen grains of real acetic acid.

Oxymel. *Oxymel.* (Clarified honey, forty ounces; acetic acid, five fluid ounces; distilled water, five fluid ounces.)

Therapeutics. When freely diluted, acetic acid, given internally, acts as a refrigerant, but is seldom employed for this purpose. Externally, in its strong form, it is used as a rubefacient: sometimes as a vesicant and escharotic; but the glacial acid is more effective for such purposes; much diluted, it may be used to sponge the surface in fevers, to check excessive perspiration also in cooling lotions. Acetic acid is more frequently employed on account of its solvent powers, than for any therapeutic value it may possess, as in the preparation of Liquor Epispasticus.

Dose. Of dilute acetic acid, 1 fl. drm. to 2 fl. drm. diluted still more. Of oxymel 1 fl. drm. to 2 fl. drm.

Adulteration. Foreign acids and metallic impurities, as copper, detected by the above tests.

ACIDUM ACETICUM GLACIALE. Glacial Acetic Acid. Concentrated acetic acid, containing nearly 99 per cent. of real acetic acid, $\mathbf{HC_2H_3O_2}$.

Prep. This is prepared by distilling acetate of sodium, from which the water has been expelled by heat, with sulphuric acid, by which means sulphate of sodium is formed, and acetic acid distils over. If the product shows any sulphurous acid when tried by the subacetate of lead and hydrochloric acid test, it is shaken with black oxide of manganese and redistilled. Any sulphurous acid is thus converted into sulphuric acid, and remains as sulphate of manganese in the retort.

Prop. A colourless liquid at the mean temperature of the air, with a pungent acetous odour, converted when cooled into colourless prismatic crystals, which remain crystalline till the temperature rises to above 60° F. (15°·5 C.). Sp. gr. 1·058, which is increased by adding 10 per cent. of water. In consequence of this anomaly, the density alone cannot be relied on as a test of the strength of acetic acid, as between 1·063 and 1·077 the same density may indicate two very different strengths; monohydrated acetic acid and the same acid diluted with an equal weight of water having both the sp. gr. 1·063. Sixty grains by weight of glacial acetic acid require for neutralisation at least 990 grain-measures of the volumetric solution of soda. The absence of sulphurous acid is indicated by the subacetate of lead test.

Off. Prep. It is used in the preparation of Mistura Creasoti, and Acetum Cantharidis.

Therapeutics. Glacial acetic acid acts as a caustic irritant, vesicant, and escharotic. It is chiefly used as an external application.

ACETUM. Vinegar. An acid liquor, prepared from malt and unmalted grain, by the acetous fermentation.

Prep. The alcohol contained in the malt (?) under certain conditions, absorbs oxygen, and is converted into acetic acid which is contained in the vinegar. The change is thus shown: alcohol $C_2H_6O + O_2 = C_2H_4O_2 + H_2O$.

Prop. A brown liquid, with a distinctive odour. Sp. gr. from 1·017 to 1·019. One fluid ounce requires at least 402 grain-measures of the volumetric solution of soda for its neutralisation, corresponding to 5·41 per cent. of real acetic acid, $HC_2H_3O_2$. If ten minims of the chloride of barium solution be added to a fluid ounce of the vinegar, and the precipitate, if any, be removed, a further addition of the test will give no precipitate, indicating that not more than a $\frac{1}{1000}$ part of sulphuric acid is present, the greatest amount legally permitted.

Sulphuretted hydrogen causes no change of colour, showing the absence of metallic impurities.

Therapeutics. The action of vinegar is the same as that of dilute acetic acid of equal strength.

Dose. Of vinegar, 1 fl. drm. to 2 fl. drm. diluted.

Adulteration. Sulphuric acid may be added to vinegar, and metallic impurities may be present from the vessel in which it is kept. It should be scarcely affected by chloride of barium, or oxalate of ammonium, and not at all by sulphuretted hydrogen.

ACIDUM ARSENIOSUM. *Vide* Preparations of Arsenic.

ACIDUM BENZOICUM. *Vide* Gum Benzoin.

ACIDUM BORICUM. Boric Acid. Boracic acid. H_3BO_3. A weak acid obtained from borax (biborate of sodium), by the action of sulphuric acid; also by the purification of native boric acid.

Prep. By decomposing a hot solution of borax, $Na_2B_4O_7 + 10H_2O$, with sulphuric acid, and separating the crystals which form on cooling.

Prop. Boric acid consists of pearly scaly crystals or irregular masses of crystals, odourless, with a slightly bitter and sour taste, and feebly acid reaction ; sparingly soluble in cold water, and in alcohol, more freely in boiling water, and in glycerine ; an alcoholic solution burns with a characteristic green flame. The crystals liquify when warmed. The aqueous solution should not yield more than a faint opalescence with chloride of barium, nitrate of silver, or oxalate of ammonium ; should give no precipitate with sulphydrate of ammonium, nor give a strong persistent yellow tinge to a spirit flame.

Off. Prep. **Unguentum Acidi Borici.** *Boric Acid Ointment.* (Boric acid, two ounces and a half; soft paraffin, ten ounces ; hard paraffin, five ounces.)

Therapeutics. Boric acid, formerly called "Homberg's Sedative Salt," was supposed to possess anodyne properties. It produces little or no irritation when externally applied ; from its power of arresting the activity of low organisms it is a valuable antiseptic, disinfectant and deodorant. Boric or boracic lint, made by soaking lint in a boiling saturated solution, and drying, is used as an antiseptic dressing for wounds and ulcers. Mixed with starch, it may be employed as a "dusting powder" for infants. Boroglyceride, a patented preparation, is recommended as a powerful antiseptic and preservative, but is not official.

Dose. Of boric acid, 5 gr. to 30 gr.

ACIDUM CARBOLICUM. *Vide* p. 176.

ACIDUM CARBOLICUM LIQUEFACTUM. *Vide* p. 176.

ACIDUM CARBONICUM. (Not official.) Carbonic Acid.

CO_2. (Solution in water.) Aërated water.

Prep. By acting upon carbonate of calcium, as chalk, marble, &c., with dilute hydrochloric acid, and passing the gas into water under pressure.

Prop. A colourless gas, heavier than air, soluble in its own volume of water ; the solubility much increased by pressure. The solution is acid in reaction, sparkling when exposed to air from the escape of the gas. Water containing this acid has the power of holding in solution carbonates of magnesium, calcium, iron, &c.

Therapeutics. The gas directed in a stream upon a painful ulcerated surface, is stated to allay the pain. When taken into the stomach, aërated water diminishes irritability if present, and hence allays sickness ; and carbonic acid is often given in the form of effervescing medicines made with an acid and bicarbonate of an alkali, and in the granular effervescing salts of different kinds now so largely used. The water may also be usefully employed in dissolving saline remedies, as phosphates, carbonates of potassium, sodium, and lithium, &c., when it is desired to continue their use for a lengthened period.

Aërated water is now often prepared in the Gasogene apparatus, of English and French construction.

ACIDUM CHROMICUM. Chromic Acid. Anhydrous Chromic Acid or Chromic Anhydride. CrO_3.

Prep. Chromic anhydride is obtained by the action of strong sulphuric acid on a concentrated solution of bichromate of potassium.

Prop. It occurs in crimson acicular crystals, very deliquescent, inodorous, and corrosive. Soluble in water, forming an orange-red solution of true chromic acid, H_2CrO_4. It is a powerful oxidising agent, decomposing alcohol, glycerine, ether, &c., with evolution of heat, and occasionally with explosive violence. At high temperatures it melts and evolves oxygen. When warmed with hydrochloric acid, chlorine is given off. Mixed with cold alcohol, aldehyd is evolved, and a green residue remains.

Off. Prep. **Liquor Acidi Chromici.** *Solution of Chromic Acid.* (Chromic acid, one ounce; distilled water, three fluid ounces.) An orange red, inodorous, caustic, strongly acid fluid, containing the equivalent of 25 per cent. of anhydrous chromic acid, or chromic anhydride, CrO_3, or 29·5 per cent. of real chromic acid, H_2CrO_4. Sp. gr. 1·185.

Therapeutics. Chromic acid, from its oxidising properties, is a powerful deodoriser and disinfectant. It is chiefly used as a caustic to destroy condylomata, a watery solution of one in four being employed for this purpose. More dilute solutions (one in forty) are recommended for ulcerated gums, and for syphilitic affections of the tongue, pharynx, and larynx.

ACIDUM CITRICUM. Citric Acid. $H_3C_6H_5O_7,H_2O$. An acid obtained from lemon juice, or the juice of the fruit of Citrus Limetta, the Lime.

Prep. Lemon juice, four pints; prepared chalk, four and a half ounces; sulphuric acid, two and a half fluid ounces; distilled water, a sufficiency. Add the chalk to the lemon juice at its boiling point; wash the precipitate of citrate of calcium with hot water till there is no more colour dissolved. Add the sulphuric acid, diluted, to the precipitate diffused in a pint of water. Boil, filter the liberated citric acid from the insoluble sulphate of calcium, and concentrate to a density of 1·21; cool, and after twenty-four hours decant from other crystals of sulphate of calcium which will have formed, and further concentrate till a film forms on the surface; cool and crystallise.

Prop. Large transparent colourless crystals, right rhombic prisms, of an agreeable acid taste, decomposed by heat, very soluble in water, and less so in spirit; insoluble in pure ether. The crystals dissolve in three-fourths of their weight of cold, and in half their weight of boiling, water. An aqueous solution of 40 grains to the ounce resembles lemon juice closely, and gets mouldy on keeping. It does not render lime-water turbid (citrate of calcium is, however, a sparingly soluble salt), and causes no precipitate with any salt of potassium except the tartrate, from which it throws down the acid tartrate of that base. The aqueous solution is not darkened by sulphuretted hydrogen, nor precipitated by chloride of barium, showing the absence of metallic impurities and sulphates. Seventy grains of the acid dissolved in water are neutralised by 1000 grain-measures of the volumetric solution of soda.

Therapeutics. Citric acid given internally appears to act as a refrigerant, but there is no clinical evidence of its being able to diminish febrile heat; it merely allays thirst and irritation of the skin. It is used as a solvent for caffeine.

Dose. 10 gr. to 30 gr. or more, dissolved in water and sweetened.

Free citric acid is contained in Vinum Quiniæ, Succus Limonis, and Syrupus Limonis.

Adulteration. Traces of sulphuric and tartaric acids may be present, also lead and copper.

ACIDUM HYDROBROMICUM DILUTUM. Dilute Hydrobromic Acid. An aqueous solution of 10 per cent. of gaseous or real hydrobromic acid (**HBr**).

Prep. Bromine, one fluid ounce; distilled water and sulphuretted hydrogen, of each a sufficiency. A current of sulphuretted hydrogen is passed into a mixture of bromine and water until the red colour of the liquid has disappeared. The fluid is filtered and distilled, the first portion of the distillate being rejected. The distilled acid is then diluted with water until it has a sp. gr. of 1·077 at 60° F. (15°·5 C.).

Prop. A clear colourless liquid, odourless, with strong acid taste and acid reaction; completely volatilised by heat; sp. gr. 1·077; treated with chlorine or nitric acid bromine is liberated, and can be dissolved in chloroform or carbon disulphide, when the solution acquires a yellow colour. With nitrate of silver it yields a white curdy precipitate, insoluble in nitric acid, and only sparingly soluble in solution of ammonia. It should not give a white precipitate with chloride of barium (absence of sulphuric acid). 810 grains by weight require for neutralisation 1000 grain-measures of the volumetric solution of soda.

Therapeutics. It may be used as a substitute for other bromides, differing from them in not producing so much depression. As a solvent of quinine it lessens or prevents cerebral symptoms. It is useful in headache and singing in the ears, either idiopathic or due to quinine. It has been used in epilepsy, hysteria, neuralgia, nervous exhaustion, and palpitation.

Dose. 15 min. to 50 min.

ACIDUM HYDROCHLORICUM. Hydrochloric Acid. Hydrochloric acid gas (HCl) dissolved in water, and forming 31·8 per cent. by weight of solution.

Prep. By the action of sulphuric acid and water on chloride of sodium (common salt) in a glass retort, sulphate of sodium and hydrochloric acid are formed; the latter distils over, and is collected in a receiver containing water, which absorbs the gas rapidly.

Prop. A nearly colourless transparent liquid, with a suffocating odour, and very sour taste, giving off white acrid fumes when exposed to air; sp. gr. 1·16; entirely dissipated by heat. It gives with nitrate of silver a curdy white precipitate (chloride of silver), soluble in excess of ammonia, but not in nitric acid. 114·8 grains by weight, mixed with half an ounce of distilled water, require for neutralisation 1000 grain-measures of the volumetric solution of soda.

Hydrochloric acid has no action on gold leaf, even when boiled with it; this is shown by the acid, after digestion on the metal, not giving any precipitate with protochloride of tin; nor does the acid decolorise a solution of sulphate of indigo, indicating the absence of free chlorine. When diluted with 4 volumes of distilled water it gives no precipitate with chloride of barium or sulphuretted hydrogen, and does not tarnish bright copper foil when boiled with it, proving the absence of sulphates, and earthy or metallic matter.

The absence of sulphuric acid is proved with granulated zinc and lead acetate, as in the case of acetic acid.

Off. Prep. **Acidum Hydrochloricum Dilutum.** *Dilute Hydrochloric Acid.* (Hydrochloric acid, eight fluid ounces; distilled water, a sufficiency. Dilute the acid with sixteen ounces of the water, then add more water, so that at 60° F. (15°·5 C.) it shall measure 20 fluid ounces.)

Its sp. gr. is 1·052; six fluid drachms require for neutralisation 1000 grain-measures of the volumetric solution of soda, equivalent to 10·58 per cent. of real acid. Six fluid drachms contain one equivalent, or 36·5 grains of hydrochloric acid ($\mathbf{HCl}$).

Therapeutics. Externally it acts as a powerful caustic, and produces a white stain on the skin, which afterwards sloughs. (It has been described as white gangrene when it occurred in a case of malingering.) Internally, in a concentrated state, it is an acrid poison: in a dilute form, a refrigerant, tonic and astringent. It is given in some forms of atonic dyspepsia, from an idea of its being the acid of the gastric juice: also in low states of the system, as in the petechial form of exanthematous diseases. It is also used as a gargle in ulceration of the throat, and in diphtheria.

Dose. Of dilute hydrochloric acid, 10 min. to 30 min. diluted freely.

Adulteration. Sulphuric acid, chlorine and iron, for which the tests are given. The commercial acid is generally coloured from the presence of the latter impurities.

Acidum Nitro-Hydrochloricum Dilutum. *See* Official Preparations of Acidum Nitricum.

ACIDUM HYDROCYANICUM DILUTUM. Dilute Hydrocyanic Acid, or Prussic Acid. Hydrocyanic acid ($\mathbf{HCN}$) dissolved in water, and constituting 2 per cent. by weight of the solution.

Prep. Ferrocyanide of potassium, two ounces and a quarter; sulphuric acid, one fluid ounce; distilled water, thirty fluid ounces, or a sufficiency. Mix the acid with four fluid ounces of the water, and to these, placed in a retort, when they have cooled, add the ferrocyanide of potassium, first dissolved in half-a-pint of the water. Put them into a retort, and adapt this to a receiver, containing eight ounces of the water, which must be kept carefully cold. Distil with a gentle heat till the fluid in the receiver measures seventeen ounces; lastly, add three ounces, or as much water as may be necessary to bring the acid to the required strength, so that one hundred grains (or 110 minims) of it, precipitated with a solution of nitrate of silver, shall yield ten grains of dry cyanide of silver. When the above proportions are observed in this preparation, the chief changes are, that the ferrocyanide is decomposed in such a manner that half its cyanogen passes over as free hydrocyanic acid, while a yellowish-white precipitate is formed of $\mathbf{K_2Fe_2Cy_6}$, together with crystals of sulphate of potassium, thus:

$$2\mathbf{K_4FeCy_6,3H_2O+3H_2SO_4=K_2Fe_2Cy_6+3K_2SO_4+3H_2O} \\ +6\mathbf{HCy}.$$

Prop. A colourless liquid of peculiar odour and taste, entirely volatilised by heat, with a very slight acid reaction, and the reddening produced on litmus paper fugitive in character. Sp. gr. 0·997. Treated with a minute quantity of a mixed solution of sulphate and persulphate of iron, and afterwards with potash, and finally acidulated with hydrochloric acid, it forms Prussian blue. With nitrate of silver it gives a white precipitate (cyanide of silver), entirely soluble in boiling concentrated nitric acid. 270 grains of it, rendered alkaline by solution of soda, require 1000 grain-measures of the volumetric solution of nitrate of silver to be added, before a permanent precipitate begins to form, which corresponds to 2 per cent. of the real acid, **HCN**. For the explanation of this test, see Appendix under Vol. Sol. of Nitrate of Silver.

The dilute acid, when pure, is not coloured by sulphuretted hydrogen nor precipitated by chloride of barium, showing the absence of metallic taint or sulphuric acid, and no red colour is produced on the addition of the iodo-cyanide of potassium and mercury, showing the absence of any foreign acid.

The anhydrous acid is colourless, with a more intense odour than the dilute, sp. gr. 0·697, very volatile, and rapidly decomposed into a carbonaceous-looking matter. The dilute acid can be much longer preserved when a little mineral acid is present, as a trace of sulphuric or hydrochloric acid.

Off. Prep. **Vapor Acidi Hydrocyanici.** *Inhalation of Hydrocyanic Acid.* (Diluted hydrocyanic acid, 10 min. to 15 min., cold water, 1 fl. drm. Mix in suitable apparatus, and let the vapour be inhaled.)

Also contained in tincture of chloroform and morphine.

Therapeutics. Anhydrous prussic acid is one of the most intense and rapid poisons known. Its effects are the same whether it be inhaled, injected into the blood or subcutaneously, or applied to any of the mucous surfaces. It may cause death in two ways:

1. A large dose proves fatal in a few seconds. The animal falls as if struck by lightning, with or without a cry; its pupils are widely dilated. The nerve-centres and heart appear to have their functions instantaneously arrested.

2. A smaller, but still fatal dose, causes death by apnœa. The breathing is slow and gasping, the heart's action and pulse almost imperceptible; the pupils are dilated; consciousness is abolished. Death is usually preceded by suffocative convulsions. The dyspnœa is probably due to paralysis of the respiratory centre in the medulla oblongata; moreover, the acid combines with the hæmoglobin of the red corpuscles, and may perhaps interfere with the giving-up of oxygen to the tissues. In this form of poisoning, recovery is still possible. The first measure to be adopted is artificial respiration, which must be kept up steadily for some length of time. An auxiliary measure is the subcutaneous injection of atropine, which Preyer regards as a physiological antidote to hydrocyanic acid. *See* Atropine.

When much diluted, and in medicinal doses, it allays pain and spasm, and if the dose be large, it induces giddiness, &c. It is given in painful affections of the stomach and intestines, as in gastrodynia, enterodynia, pyrosis, and vomiting; also in chest affections, as pertussis, asthma, and other cases where the character of the cough is nervous; occasionally it is used to allay palpitation of the heart, especially when connected with dyspepsia, and the author is of opinion that it is in cases of functional palpitation that its efficacy is most marked; in fact that it is of comparatively little service in organic cardiac diseases. Hydrocyanic acid has been also used in certain affections of the nervous system, as in chorea, hysteria, neuralgia, epilepsy, and tetanus. The vapour may be employed to produce the local action upon the lungs in chest affections.

Externally applied it allays irritation of the skin, and when freely diluted may be used in the form of lotion in cutaneous affections accompanied with much itching; also to allay pain in some forms of neuralgia;—great care should be taken that the skin is not abraded, as it might produce even fatal results.

Dose. Of dilute hydrocyanic acid 2 min. to 8 min.

Externally, in the form of lotion, 1 fl. drm. or more may be added to 10 oz. of water, lead lotion, or almond emulsion; glycerine may also be usefully added to the lotion, as it retards evaporation and prolongs the effect of the acid upon the part.

Scheele's acid may contain 5 per cent. of anhydrous acid, but it is so little used that from long keeping it is generally weaker than the Pharmacopœia acid; it should not be employed in medicine. Aqua Lauro-Cerasi, or cherry-laurel water, which owes its activity to hydrocyanic acid, is described under Laurocerasus.

Incompatibles. It is often prescribed with alkalies, as liquor potassæ, &c.; then a cyanide of the metal is formed, which acts in the same manner as the acid. The cyanates are not poisonous; they appear in the urine as carbonates.

ACIDUM LACTICUM. Lactic Acid. $HC_3H_5O_3$. Containing 75 per cent. of lactic acid in water.

Prep. Produced by the action of a peculiar ferment on a solution of sugar, and subsequent purification of the product.

Prop. A colourless syrupy liquid, odourless, with strong acid taste, and acid reaction. Mixes freely with water, alcohol and ether; nearly insoluble in chloroform. Sp. gr. 1·21. On being heated to about 350° F. (176°·7 C.), it yields inflammable gases, and the residue chars, and finally almost entirely disappears. A solution in about 10 parts of water, neutralised by ammonia, is not precipitated by sulphydrate of ammonium. Not more than a faint opalescence is produced with chloride of barium, nitrate of silver, or oxalate of ammonium, nor is any precipitate formed on boiling with excess of Fehling's solution. 120 grs. require for neutralisation 1000 grain-measures of volumetric solution of soda.

Off. Prep. **Acidum Lacticum Dilutum.** *Dilute Lactic Acid.* (Lactic acid, three fluid ounces; distilled water, sufficient to produce one pint.) Sp. gr. 1·04. 800 grains by weight require for neutralisation 1000 grain-measures of the volumetric solution of soda.

Therapeutics. Diluted with 5, 8, or more parts of water, it has been used as a solvent for the false membrane in diphtheria, either as spray or lotion. In dyspepsia and vesical catarrh it is sometimes used in place of hydrochloric acid. In diabetes also it has proved of great service.

Dose. Of dilute lactic acid ½ fl. drm. to 2 fl. drm.

ACIDUM MECONICUM. *Vide* Opium.

ACIDUM NITRICUM. Nitric Acid; Aqua fortis. Containing 70 per cent. by weight of nitric acid, HNO_3.

Prep. By the action of sulphuric acid in excess upon nitrate of potassium or nitrate of sodium in a glass retort, when nitric acid and bisulphate of potassium or sodium are formed; the former being volatile, distils over. $KNO_3 + H_2SO_4 = KHSO_4 + HNO_3$ or $NaNO_3 + H_2SO_4 = NaHSO_4 + NaNO_3$.

Prop. A colourless transparent liquid, with a strongly acrid odour, and intensely acid taste; with sp. gr. 1·42, and boiling-point 250° F. (121° C.); it fumes in the air, and entirely volatilises with heat. If it be poured over copper filings, dense red vapours are immediately formed; but if mixed with an equal volume of water, and then added to the copper, it gives off a colourless gas (NO), which, upon contact with air, becomes an orange vapour (NO_2), and when conducted into a solution of sulphate of iron, communicates to it a dark-brown colour. When diluted with six parts of water, it gives no precipitate, either with nitrate of silver, or chloride of barium. If distilled, the product is uniform throughout the process. Ninety grains by weight of it mixed with half an ounce of distilled water, require for neutralisation 1000 grain-measures of the volumetric solution of soda.

Off. Prep. **Acidum Nitricum Dilutum.** *Dilute Nitric Acid.* (Nitric acid, six fluid ounces; dilute it with twenty-four fluid ounces of water, then add more water, so that at a temperature of 60° F. (15°·5 C.) it shall measure thirty-one fluid ounces.)

Colourless; sp. gr. 1·101. Six fluid drachms require for neutralisation 1000 grain-measures of the volumetric solution of soda, corresponding to 17·44 per cent. of real nitric acid (HNO_3).

Acidum Nitro-Hydrochloricum Dilutum. *Dilute Nitro-Hydrochloric Acid.* (Nitric acid, three fluid ounces; hydrochloric acid, four fluid ounces; distilled water, twenty-five fluid ounces.) Sp. gr. 1·07. Six fluid drachms require for neutralisation 883 grain-measures of the volumetric solution of soda.

Therapeutics. Externally, as a caustic, strong nitric acid is employed as an application to phagedenic sores, and for the destruction of warts, care being taken to protect the surrounding parts; also for the removal of hæmorrhoids; it produces a yellow stain on the skin, from the production of picric acid, and causes sloughing. In the diluted form, it has been used as an application to ulcers, and also to diseases of the skin, as in cancrum oris. Injected in a very dilute state into the bladder, it has proved effectual in the solution of phosphatic calculi.

Internally it may be given as a refrigerant and tonic in cases similar to those for which sulphuric acid is administered, as in febrile diseases, and for preventing phosphatic deposits: it is also very useful as a stomachic tonic in some forms of dyspepsia. Nitric acid seems to possess powers not connected simply with its acid properties, for in certain scrofulous states of the system, and in syphilis, occurring in habits where mercury cannot be given, it often proves very serviceable. Nitric acid also appears to have some influence over the liver, and in certain torpid conditions of that organ may be given with advantage. It is also given in some forms of cutaneous disease as an alterative.

Dilute nitro-hydrochloric acid has an action similar to that of a solution of chlorine, and is used as a tonic and stomachic in dyspepsia; also in phosphatic deposits in the urine. It is thought to have a considerable influence over the action of the liver, and to possess alterative powers. It is employed in chronic hepatitis, syphilitic cachexia, &c. Externally it is used as a bath in the above-named diseases.

Dose. Of dilute nitric acid, 10 min. to 30 min. freely diluted. Of dilute nitro-hydrochloric acid, 5 min. to 20 min. freely diluted. As a bath, 6 fl. oz. to each gallon of water (in a wooden vessel).

Adulteration. Chiefly sulphuric and hydrochloric acids, detected by the barium and silver tests above given.

ACIDUM OLEICUM. *Vide* p. 316.

ACIDUM PHOSPHORICUM CONCENTRATUM. Concentrated Phosphoric Acid, $\mathbf{H_3PO_4}$ with 33·7 per cent. of water.

Prep. (Phosphorus, four hundred and thirteen grains; nitric acid, six fluid ounces; distilled water, a sufficiency.) The acid, diluted with eight ounces of distilled water, is put into a glass flask, the mouth of which is connected with a vertical glass condenser. The phosphorus being added, the contents of the flask are boiled at such a rate that all condensed products are returned to the flask. When the phosphorus has entirely dissolved, the fluid is concentrated in the flask, or in a porcelain dish, until reduced to four fluid ounces; it is then transferred to a platinum vessel, and evaporation is continued until it is reduced to two fluid ounces, and orange-coloured vapours are no longer formed. It is then mixed with distilled water, until, when cold, it measures three fluid ounces, and has a sp. gr. of 1·5.

It may also be prepared from phosphorus by treatment of the product of atmospheric oxidation with water and a little nitric acid.

Prop. A colourless, syrupy liquid, with a sour taste, and strongly acid reaction. After dilution it does not precipitate chloride of barium or nitrate of silver acidulated with nitric acid, nor is it coloured by sulphuretted hydrogen; these tests show the absence of sulphuric acid, chlorides, or metallic impurities. With ammonio-nitrate of silver phosphoric acid gives a canary-yellow precipitate soluble in ammonia, and in dilute nitric acid. When evaporated it leaves a residue which melts at a low red heat, and upon cooling exhibits a glassy appearance. It is not precipitated by a solution of albumen, which shows that it is not the monobasic variety of the acid. Diluted and mixed with an equal volume of solution of perchloride of mercury, and heated, no precipitate is formed, showing the absence of pyrophosphates. When mixed with an equal volume of pure sulphuric acid and then introduced into solution of sulphate of iron, it does not communicate to it a dark colour, showing the absence of nitric acid.

73·8 grains by weight mixed with 180 grains of oxide of lead in fine powder leave, by evaporation, a residue (principally phosphate of lead), which heated to dull redness weighs 215·5 grains.

Off. Prep. **Acidum Phosphoricum Dilutum.** *Dilute Phosphoric Acid.* (Concentrated phosphoric acid, three fluid ounces; distilled water, a sufficiency to form a pint.) A colourless liquid of sp. gr. 1·08, corresponding to 13·8 per cent. of phosphoric acid, or 10 per cent. of phosphoric anhydride.

355 grains poured upon 180 grains of litharge in fine powder, leave after evaporation a residue, chiefly phosphate of lead, which heated to dull redness weighs 215·5 grains. Six fluid drachms therefore correspond to 35·5 grains of anhydrous phosphoric acid (or a quarter of an equivalent of $\mathbf{P}_2\mathbf{O}_5$).

Therapeutics. Dilute phosphoric acid acts in a similar manner to dilute sulphuric acid, but is much less powerfully astringent. It has been asserted to allay thirst in diabetes, and is supposed to exert an influence on the growth of osseous tumours. Phosphoric acid may be administered in much larger doses than the other mineral acids, and it seems probable that it would be the acid most adapted for the treatment of affections connected with the excretion of alkaline urine. Phosphoric acid has also been given in scrofulous affections, and it is stated with advantage.

Dose. Of the concentrated acid 2 min. to 5 min. freely diluted; of the diluted acid, 10 min. to 30 min.

Adulteration. Sulphuric acid, hydrochloric acid, and metallic impurities detected by the above tests.

ACIDUM SALICYLICUM. *Vide* p. 179.

ACIDUM SULPHURICUM. Sulphuric Acid; Oil of Vitriol.

An acid containing 98 per cent. by weight of H_2SO_4.

Prep. Made by passing sulphurous anhydride, generated by burning sulphur, into leaden chambers where it meets with steam and nitrous anhydride; from the latter it absorbs an atom of oxygen, and is thereby converted into sulphuric anhydride; and this combines with water to form sulphuric acid. ($SO_2 + H_2O + N_2O_3 = H_2SO_4 + 2NO$.)

Prop. An oily-looking colourless liquid; sp. gr. 1·843, having no odour, but an intensely burning acid taste, chars most vegetable substances and becomes darkened, absorbs water rapidly, and when mixed with it evolves great heat. Diluted with an equal measure of water it generally gives a slight white precipitate of sulphate of lead (derived from the leaden chambers), which is held in solution by the strong acid; when diluted with water it gives a copious precipitate with chloride of barium. Diluted with six parts of water, it should give no yellow precipitate with sulphuretted hydrogen, indicating the absence of arsenic, &c. 50 grains by weight, mixed with an ounce of distilled water, require for neutralisation 1000 grain-measures of the volumetric solution of soda. It leaves no residue when evaporated in a platinum crucible. When a solution of sulphate of iron is poured upon oil of vitriol, no purple ring is formed at the surface of the two solutions; this shows the absence of nitrous acid.

Off. Prep. **Acidum Sulphuricum Aromaticum.** *Aromatic Sulphuric Acid.* (Sulphuric acid, three fluid ounces; rectified spirit, thirty-six fluid ounces; spirit of cinnamon, two fluid ounces; strong tincture of ginger, two fluid ounces.) Sp. gr. 0·911. 195 grains by weight require for neutralisation 500 grain-measures of the volumetric solution of soda, corresponding to 12·5 per cent. of anhydrous sulphuric acid. Six fluid drachms therefore correspond to 37·5 grains of real acid (H_2SO_4).

Acidum Sulphuricum Dilutum. *Dilute Sulphuric Acid.* (Sulphuric acid, seven fluid ounces; dilute it with 77 fluid ounces of water, and when the mixture has cooled to 60° F. (15°·5 C.) add more water, so that it shall measure 83½ fluid ounces.) Sp. gr. 1·094. Six fluid drachms require for neutralisation 1000 grain-measures of the volumetric solution of soda, corresponding to 13·65 per cent. of sulphuric acid. Six fluid drachms therefore correspond to half an equivalent of real sulphuric acid.

Therapeutics. Externally the strong acid is a most powerful caustic, rapidly destroying all the tissues with which it comes in contact; internally, when much diluted, it acts as a refrigerant, tonic, and astringent. It is used to allay thirst in fever, especially when of a hectic character, to check excessive sweating in phthisis, to diminish passive mucous discharges and hæmorrhages, to improve digestion, and brace up the system in debility. Given for some time it increases the acidity of the urine, and may be employed in phosphatic deposits. It has likewise been found serviceable in some chronic skin diseases connected with a low state of system, as in pompholyx diutinus, &c. Recently it has been much extolled for checking diarrhœa.

Dose. Of dilute sulphuric acid, 5 min. to 30 min., freely diluted; of aromatic sulphuric acid, 5 min. to 30 min.

Adulteration. Water, indicated by a lower specific gravity. Lead, detected on dilution; arsenic, from the use of impure sulphur in the manufacture; and hydrochloric acid, from impurities in the nitre made use of, are sometimes present. Oil of vitriol often becomes much discoloured from a trace of organic matter, such as wood, cork, &c.

ACIDUM SULPHUROSUM. Sulphurous Acid. Sulphurous acid gas, SO_2, dissolved in water, and constituting 5 per cent., by weight, of the solution.

Prep. By distilling sulphuric acid with wood charcoal in coarse powder, when the carbon combines with part of the oxygen of the sulphuric acid to form carbonic acid, and leaves sulphurous acid.

Prop. The solution is colourless, with a suffocating odour of burning sulphur; sulphurous acid is a powerful deoxidising agent, liberating iodine from iodic acid, decomposing sulphuretted hydrogen, &c.

When evaporated, the solution leaves no residue; it gives no precipitate, or a very slight one, with chloride of barium, indicating that no sulphuric acid is present, but a copious one if solution of chlorine be also added (sulphate of barium). Sp. gr. 1·025. 64 grains by weight, mixed with one pint of water and a little mucilage of starch, do not acquire a permanent blue colour with the volumetric solution of iodine, until 1000 grain-measures of the latter have been added.

The formula representing the decomposition which ensues in the use of this volumetric test, is as follows: $SO_2 + 2H_2O + I_2 = H_2SO_4 + 2HI$; therefore no blue colour appears until more than two equivalents of iodine have been added to each equivalent of sulphurous acid, or 3·2 grains of sulphurous acid require 12·7 grains of iodine, or 1000 measures of its volumetric solution.

Therapeutics. Sulphurous acid has a destructive influence on vegetable life, and upon this its therapeutic value, probably, for the most part depends. Externally applied, it causes irritation and redness, and has been used for the treatment of skin affections, especially when parasitic; *e.g.*, in the various forms of tinea, pityriasis versicolor, favus, &c. It is a valuable application to fœtid sores and raw surfaces. It may be used in solution, more or less diluted with glycerine, or applied as vapour from burning sulphur.

Internally it is not often given in the free state; the solution, in the form of spray, is very useful in ulcerative stomatitis and tonsillitis; also for removing the fœtid sordes by which the mouth is blocked up in the malignant forms of fever.

See Sodii Sulphis, and Sodii Hyposulphis.

Dose. ½ fl. drm. to 1 drm. A strong solution of the acid may be diluted with about an equal bulk of glycerine or some other liquid, and painted on the affected skin.

ACIDUM TARTARICUM. Tartaric Acid. $H_2C_4H_4O_6$.

Prep. From the acid tartrate of potassium (cream of tartar) by the addition of chalk, whereby an insoluble tartrate of calcium is formed with half the acid in the acid tartrate, and a neutral tartrate of potassium left in solution, the acid of which is afterwards likewise formed into tartrate of calcium by decomposition of the potassium salt with chloride of calcium. Lastly, tartaric acid is separated from the purified tartrate of calcium by decomposition with sulphuric acid. The formulæ representing the decompositions which occur in the above process may be thus exhibited:

1st part of process,—

$$2(KHC_4H_4O_6) + CaCO_3 = CaC_4H_4O_6 + K_2C_4H_4O_6 + CO_2 + H_2O.$$

2nd part of process,—

$$K_2C_4H_4O_6 + CaCl_2 = CaC_4H_4O_6 + 2KCl.$$

3rd part of process,—

$$CaC_4H_4O_6 + H_2SO_4 = H_2C_4H_4O_6 + CaSO_4.$$

Prop. In colourless transparent crystals, oblique rhombic prisms, with a sour but agreeable taste, decomposed entirely by heat, soluble in water and in rectified spirit, the solution precipitating acid tartrate of potassium from any neutral salt of potassium. The solution should not give a precipitate with sulphate of calcium, oxalate of ammonium, or sulphuretted hydrogen, showing the absence of oxalic acid, calcium, or other fixed impurities. Twenty-five grains dissolved in water require for saturation 330 grain-measures of the volumetric solution of soda.

Therapeutics. Tartaric acid acts in the same way as citric acid, diminishing thirst in fevers ; it is more commonly given for such purposes in the form of cream of tartar, or with bicarbonate of sodium, in an effervescing state.

Dose. 10 gr. to 30 gr. or more, dissolved in water and sweetened.

Adulteration. Sulphuric acid may be present from imperfect preparation. Acid tartrate of potassium and alum have occasionally been added. Lead and copper have also been found as impurities.

AMMONIUM AND ITS SALTS.

($2NH_4$.)

When pure, ammonia is a colourless gas, capable of being liquefied ; of very pungent odour, the fumes producing an alkaline reaction ; it forms salts with acids, and by most chemists these salts are regarded as containing a hypothetical radical called ammonium (NH_4) ; thus sal ammoniac may be regarded as a chloride of ammonium (NH_4Cl). Gaseous ammonia is sometimes made use of therapeutically, evolved usually from liquor ammoniæ, in which it is contained.

LIQUOR AMMONIÆ FORTIOR. Strong solution of Ammonia. Ammoniacal gas (NH_3), dissolved in water and constituting 32·5 per cent. of the solution.

Prep. Three pounds of chloride of ammonium and four pounds of slaked lime are mixed, put in an iron pot, and connected with a series of wash bottles, and lastly with a matrass containing twenty-two ounces of water. Heat is applied to the metal pot till no more gas escapes. The process being terminated, the matrass will contain about forty-three fluid ounces of strong solution of ammonia. ($2NH_4Cl + CaH_2O_2 = CaCl_2 + 2NH_4HO$.)

Prop. The strong solution has a sp. gr. 0·891, is colourless, giving off pungent fumes when exposed to air, and has a strong alkaline reaction. When diluted with four times its volume of distilled water no colour or precipitate should be produced by sulphydrate of ammonium or lime water, by oxalate of ammonium, or ammonio-sulphate of copper: showing the absence of most ordinary metallic impurities, carbonic acid, calcium, or arsenic; the solution, when treated with an excess of nitric acid, is not rendered turbid by nitrate of silver or chloride of barium, indicating freedom from chlorides and sulphates. 52·3 grains require for neutralisation 1000 grain-measures of the volumetric solution of oxalic acid. One fluid drachm contains 15·83 grains of ammonia, $\mathbf{NH_3}$.

Off. Prep. **Liquor Ammoniæ.** *Solution of Ammonia.* (Strong solution of ammonia, one pint; distilled water, two pints.) Sp. gr. 0·959. 85 grains by weight require for neutralisation 500 grain-measures of the volumetric solution of oxalic acid, corresponding to 10 per cent. by weight of ammonia, $\mathbf{NH_3}$. One fluid drachm contains 5·2 grains of ammonia. It is about one-third of the strength of the strong solution.

Linimentum Ammoniæ. *Liniment of Ammonia.* (Solution of ammonia, one fluid ounce; olive oil, three fluid ounces.) Strong solution of ammonia is an important ingredient in Linimentum Camphoræ Compositum.

Spiritus Ammoniæ Fœtidus. *See* Asafœtida.

Therapeutics. In medicinal doses free ammonia, as exhibited in any of its preparations, produces warmth at the epigastrium, and acts as an antacid; increases the force and frequency of the pulse, allays spasm, and promotes the secretions from the skin and mucous membranes, especially the bronchial. In larger doses throbbing and pain in the head, with heaviness, are induced; and in still larger medicinal doses, emetic effects; beyond this poisonous irritant symptoms may be caused. The action of ammonia differs much from that of alcohol, probably influencing the ganglionic and spinal systems rather than the brain proper, and increasing the functions of the secreting and excreting organs. It does not render the urine alkaline, but perhaps a portion appears in that fluid as nitric acid. Externally applied, ammonia is rubefacient, and even vesicant.

Ammonia is given to rouse the system in syncope; to diminish spasm in hysteria; to relieve nervous headache, the after-effects of alcohol, and delirium tremens; also as a stimulant in low states of the system, as typhoid forms of fever; in pneumonia and bronchitis, in which the expectorant power is also useful; as a stimulant and antacid in low forms of dyspepsia connected with increased secretion of acid and flatulence in the stomach.

Externally it is applied to the mucous membrane of the nose in syncope and insensibility (in such cases care should be taken not to use too strong solutions); occasionally also it is inhaled, *very much diluted*, as an expectorant in chronic bronchitis. On the skin it is used, combined with volatile or essential oils, in most cases where a counter-irritant effect is desired to be produced by means of an embrocation, as over painful parts, stiff joints, &c. Liquor ammoniæ fortior, rubbed up with lard, will vesicate rapidly, if evaporation be prevented.

Ammonia may be used with advantage in poisoning with prussic acid, digitalis, tobacco, colchicum, and other sedative drugs.

Dose. Of solution of ammonia (not the strong) 10 min. to 30 min., well diluted. The dose of the strong solution is one-third of that amount.

AMMONII CARBONAS. Carbonate of Ammonium: $N_3H_{11}C_2O_5$.

Prep. By heating a mixture of sulphate or chloride of ammonium and chalk, when chloride of calcium, and carbonate of ammonium, are formed; the latter rises in vapour, and is condensed. It is considered to be a compound of acid carbonate of ammonium (NH_4HCO_3) with carbamate of ammonium ($NH_4NH_2CO_2$).

Prop. Colourless, almost transparent, crystalline masses, with a powerful ammoniacal odour and acrid taste; strongly alkaline, volatilises with heat, soluble in water, more sparingly in spirit; and readily dissolved by acids with effervescence. Exposed to air the odour is dissipated from the continued volatilisation of the neutral carbonate at the ordinary temperature, and a white opaque powder of acid carbonate is left. The solution, when saturated with nitric acid, is not precipitated by chloride of barium or nitrate of silver, showing the absence of sulphates and chlorides. 52·3 grains, dissolved in an ounce of water, will be neutralised by 1000 grain-measures of the volumetric solution of oxalic acid. 20 grains of the salt neutralise 26¾ grains of citric, and 28¾ grains of tartaric, acid.

Off. Prep. **Spiritus Ammoniæ Aromaticus.** *Aromatic Spirit of Ammonia, often called Sal Volatile.* Carbonate of ammonium, four ounces; strong solution of ammonia, eight fluid ounces; volatile oil of nutmeg, four and a half fluid drachms; oil of lemon, six and a half fluid drachms; rectified spirit, six pints; water, three pints: mix and distil one hundred and forty ounces.) Its specific gravity is ·896 One fluid ounce requires for neutralisation 558 grain-measures of the volumetric solution of oxalic acid.

Therapeutics. Carbonate or sesquicarbonate of ammonium, when fresh, acts both internally and externally in the same manner as free ammonia (*vide* Liq. Ammoniæ); occasionally, but very seldom, it is used as an emetic; when old, or after exposure, it acts much less powerfully as an excitant, but resembles the other ammoniacal salts.

Dose. Of the salt, as a stimulant, 3 gr. to 10 gr. or more. As an emetic 30 gr. may be given well diluted; occasionally useful as an emetic in asthenic bronchitis with deficient expectoration. Of aromatic spirits of ammonia, ½ fl. drm. to 1 fl. drm.

Adulteration The salt may be deficient in volatile carbonate of ammonium on account of previous exposure; sulphates or chlorides may be present; these are detected by the tests given above.

AMMONII CHLORIDUM. Chloride of Ammonium; Sal Ammoniac. $\mathbf{NH_4Cl}$.

Prep. Generally prepared from gas liquor, by adding hydrochloric acid to neutralisation, evaporating the liquid, and purifying the crystals by sublimation. Or the ammonia of the gas liquor may be neutralised with sulphuric acid, and the sulphate of ammonium, mixed with sodium chloride, sublimed; sulphate of sodium remains behind, while the sal-ammoniac rises in the form of vapour. ($2\,\mathrm{NaCl} + (\mathrm{NH_4})_2\mathrm{SO_4} = 2\mathrm{NH_4Cl} + \mathrm{Na_2SO_4}$).

Prop. Hemispherical cakes, or pieces of such, which have a peculiar tough, fibrous structure, difficult to powder; crystallises from solution in octahedra: the salt is devoid of odour, but has a strong saline taste; soluble in water, the solution being neutral; soluble also in rectified spirit: when its aqueous solution is heated with potash, soda, or lime, free ammonia is evolved; when treated with nitrate of silver it forms a copious curdy precipitate (chloride of silver). It volatilises with heat, and leaves no residue.

Therapeutics. Its action is not well understood; it produces no primary stimulant effect, but probably, after absorption, increases the secretions of the skin and mucous membranes: by some it is considered cholagogue; by others it is regarded as emmenagogue; and there is good evidence of its action on the nervous system, as seen in its almost magical power of relieving pain in certain forms of neuralgia. It has been used as a substitute for mercury, in chronic inflammatory diseases, from an idea that it causes absorption of deposited lymph ; it is also useful in many cases of chronic bronchitis, with profuse expectoration. Externally it is slightly stimulant, and is supposed to have the power of dispersing tumors.

Before the introduction of quinine, it was employed in agues, but at the present day chloride of ammonium is not much used in Great Britain, although extensively employed in Germany and Russia in neuralgia and chronic rheumatism, and as an alterative ; it is applied externally to swollen parts, as glandular enlargements, &c. ; occasionally, from the cold produced during its solution, it is used as a refrigerant to the head.

Dose. 5 gr. to 10 gr. as an alterative ; 20 to 30 gr. as an antiperiodic. Its very salt taste is best covered by the addition of the liquid extract of liquorice.

Adulteration. Iron and lead are apt to be present in the commercial salt, from the apparatus employed in its manufacture ; the former may arise from sublimation of chloride of iron ; it stains the salt red ; neither sublime by moderate heat ; the former is detected by the addition of a few drops of nitric acid and ferrocyanide of potassium, giving rise to prussian blue ; the latter by a solution of iodide of potassium. Sometimes chloride of calcium is present, causing it to deliquesce.

AMMONII BROMIDUM. Bromide of Ammonium. $\mathbf{NH_4Br}$.

Prep. May be formed by neutralising hydrobromic acid with ammonia, evaporating and crystallising.

Prop. In colourless crystals, which become slightly yellow from decomposition and liberation of bromine, when exposed to the air, and have a pungent saline taste. Soluble in water, less so in spirit. Sublimed unchanged when heated. No blue colour is produced when its aqueous solution, together with a drop of bromine or chlorine water, are mixed with mucilage of starch, showing the absence of an iodide.

Therapeutics. Bromide of ammonium has been given in the same cases for which the potassium salt has been used, and is preferred by some. It possesses all the peculiar powers of bromine. (*See* Bromum, p. 24.)

Dose. 2 gr. to 20 gr. or more.

LIQUOR AMMONII ACETATIS FORTIOR. Strong Solution of Acetate of Ammonium, $\mathbf{NH_4C_2H_3O_2}$.

Prep. (Carbonate of Ammonium, fifteen and a half ounces ;

acetic acid, fifty fluid ounces, or a sufficiency; distilled water, a sufficiency.) Crush the carbonate of ammonium, add acetic acid until a neutral liquid results, then add sufficient water to make up to three pints.

Prop. A colourless solution, without odour, but with strong saline taste; neutral in reaction; treated with potash, it evolves ammonia, and with sulphuric acid, acetic vapours. Sp. gr. 1·073.

Off. Prep. **Liquor Ammonii Acetatis.** *Solution of Acetate of Ammonium.* (Strong solution of acetate of ammonium, four fluid ounces; distilled water, sufficient to produce one pint.) Sp. gr. 1·022.

Therapeutics. It is not a topical stimulant, like free ammonia and its carbonate, but it increases the secretions, especially of the skin, sometimes of the kidneys also; it is very commonly and largely used in the treatment of febrile states of the system, as a diaphoretic and refrigerant. It is stated, and on considerable clinical evidence, to relieve painful menstruation when given in large doses.

Dose. Of the strong solution, 25 min. to 75 min.; of liquor ammonii acetatis, 2 fl. drm. to 6 fl. drm., freely diluted; even more may be given in dysmenorrhœa.

Adulteration. It should not contain free acid or alkali, nor be given with fixed alkalies, lime, or magnesia, as ammonia is then set free.

LIQUOR AMMONII CITRATIS FORTIOR. Strong Solution of Citrate of Ammonium. $(NH_4)_3C_6H_5O_7$.

Prep. Citric acid, twelve ounces; strong solution of ammonia, eleven fluid ounces or a sufficiency; distilled water, a sufficiency. Neutralise the acid with the ammonia and add sufficient water to yield 24 fl. oz., having sp. gr. 1·209.

Off. Prep. **Liquor Ammonii Citratis.** *Solution of Citrate of Ammonium.* (Strong solution of citrate of ammonium, five fluid ounces; distilled water, sufficient to produce one pint.) Sp. gr. 1·062.

Therapeutics. Same as Acetate of Ammonium, but it is questionable if it has equal diaphoretic power.

Dose. Of strong solution, ½ fl. drm. to 1½ fl. drm.; of liquor ammonii citratis, 2 fl. drm. to 6 fl. drm.

AMMONII BENZOAS. Benzoate of Ammonium. *See* ACIDUM BENZOICUM.

SULPHYDRATE OF AMMONIUM. Appendix. NH_4HS.

Prep. To be made by passing sulphuretted hydrogen gas through a solution of ammonia to saturation.

Prop. A greenish-yellow transparent liquid, with intensely disagreeable and pungent odour. Sp. gr. 0·999. Used in the Pharmacopœia as a test, as it precipitates many metals.

Therapeutics. In large doses it acts as a powerful depressant on the nervous system, causing giddiness, drowsiness, and faintness. with nausea; in smaller ones it produces upon the secreting organs increased action, more especially seen on the bronchial mucous membrane and skin. It is used occasionally as a sudorific and expectorant in chronic skin diseases, rheumatism, and bronchitis; also in diabetes, in which it has been stated to diminish the morbid appetite, but it does not diminish the excretion of sugar. Dangerous if given incautiously, and not much employed.

Dose. 3 min. upwards, carefully increased, dropped into water at the time of administration, as it soon decomposes and deposits sulphur.

Incompatibles. Almost all metallic and acid solutions.

AMMONII NITRAS. Nitrate of Ammonium. NH_4NO_3

Prep. By neutralising dilute nitric acid with ammonia or carbonate of ammonium, and evaporating the solution till crystals are obtained. The crystals are then kept fused at a temperature not exceeding 320° F. (160° C.) till all the water is driven off.

Prop. White, crystalline masses, deliquescent, with an acrid, bitter taste. Soluble in less than its own weight in water; sparingly soluble in rectified spirit. The aqueous solution gives no precipitate with nitrate of silver or chloride of barium (absence of chlorides and sulphates). Heated with caustic potash, it evolves ammonia; with sulphuric acid, it emits nitrous fumes. Fuses at 320° F. (160° C.); at from 350° F. (176°·7 C.) to 450° F. (232°·2 C.) it is resolved into nitrous oxide gas and water ($NH_4NO_3 = N_2O + 2H_2O$).

Use. Employed in the manufacture of nitrous oxide. Not used medicinally.

AMMONII PHOSPHAS. Phosphate of Ammonium. $(NH_4)_2HPO_4$.

Prep. By mixing solutions of phosphoric acid and ammonia, and collecting the crystalline product which results.

Prop. In large transparent prisms, which effloresce on exposure to air ; it is soluble in water, insoluble in rectified spirit ; heated with potash it evolves ammonia ; it gives a canary-coloured precipitate with nitrate of silver. If 20 grains of this salt be dissolved in water and the solution of ammonio-sulphate of magnesium be added, a crystalline precipitate falls, which when well washed upon a filter with solution of ammonia diluted with an equal volume of water, dried and heated to redness, leaves 16·8 grains.

Therapeutics. Phosphate of ammonium, when in solution, is capable of dissolving a considerable amount of urate of sodium ; and clinical experience has shown that it is of value in the treatment of certain urinary diseases, where a tendency to uric acid calculi exists, and also in certain conditions of the gouty habit.

Dose. 5 gr. to 20 gr., freely diluted.

IODIDE OF AMMONIUM has been sometimes used in medicine, and seems to have nearly the same action as the iodide of potassium ; it forms a white crystalline salt, and may be given in the same doses as the last-named salt. (*See* Iodine, p. 21.)

METALLIC PREPARATIONS (ALPHABETICALLY ARRANGED).

ALUMINIUM.

(Al. Eq. = 27.)

This metal does not exist native, but is formed artificially from certain of its compounds. It has a steel-grey colour, sp. gr. 2·67, and is not readily oxidised. It forms only one oxide (Al_2O_3), a very weak base, which occurs pure in the sapphire, and combined with silica in clay, schists, &c.

ALUMEN. Alum. Sulphate of Aluminium and Potassium (Potassium Alum or Potash Alum), or of Aluminium and Ammonium (Ammonium Alum or Ammonia Alum), crystallised from solution of water.

$Al_23SO_4,K_2SO_4,24H_2O$, or $Al_23SO_4,(NH_4)_2SO_4,24H_2O$.

Prep. Usually made by burning alum schist, which contains metallic sulphides as well as alumina, and subsequent exposure to air, by which means sulphuric acid is formed ; this unites with the alumina, and the after-addition of sulphate of potassium or ammonium to the solution, causes the formation and crystallisation of the alum.

Prop. It forms transparent, white, regular octahedral crystals, having an acid sweet astringent taste and a decidedly acid reaction; it is slightly efflorescent in dry air, from a loss of some of its water of crystallisation. Alumina is precipitated from a solution of alum by the addition of alkalies and their carbonates, but re-dissolved by excess of the former, and the mixture evolves ammonia, especially when heated. A solution of alum gives also an immediate precipitate with chloride of barium (sulphate of barium); it should not be coloured blue by a mixture of ferrocyanide and ferricyanide of potassium (indicating that neither protoxide nor peroxide of iron is present).

Off. Prep. **Alumen Exsiccatum.** *Dried Alum.* It is simply potassium alum deprived of its water by heat, which first fuses the salt, and then drives off the water of crystallisation; this forms 45 or 46 per cent. of its weight. Dried, or burnt alum, as it is commonly termed, occurs as a white or light spongy mass, which is slowly but completely soluble in water. It is usually reduced to powder before being employed as a medicinal agent.

Glycerinum Aluminis. *Glycerine of Alum.* (Alum, one ounce; glycerine, five fluid ounces.)

Therapeutics. Alum acts as an astringent, and if applied as alumen exsiccatum, or burnt alum, it is a slight escharotic. Internally it first acts upon the mucous membrane of the stomach and intestines as a direct astringent; it is afterwards absorbed, and produces remote astringent effects on the various tissues and secreting organs. In large doses it is purgative. It is employed topically as a gargle or injection in sore throat, leucorrhœa, &c.; in acute ophthalmia, especially of new-born children, as a lotion; internally in hæmorrhages and passive discharges; sometimes in colica pictonum as a purgative. Alum has also gained repute in the treatment of hooping-cough.

Dose. Of alum 10 gr. to 20 gr. as an astringent, alone or combined with kino, &c.; from 30 gr. to 60 gr. may be given as a purgative. Dried alum is for external use only.

Incompatibles. Alkalies and their carbonates, tannic acid, or infusions and decoctions containing it; tartrates, salts of lead, barium, calcium, cause precipitates in solutions of alum.

ANTIMONIUM. ANTIMONY.

(Sb. Eq. = 120.)

This element is not employed in medicine in its metallic state; all the preparations are prepared from the native or black tersulphide, the most abundant ore. The symbol **Sb.** is derived from *Stibium*, a Latin name for antimony.

ANTIMONIUM NIGRUM PURIFICATUM. Purified Black Antimony. Native Sulphide of Antimony, Sb_2S_3, purified from siliceous matter by fusion, afterwards reduced to fine powder, and if still containing any soluble salt of arsenium, further purified by macerating and washing with ammonia.

Prop. It occurs as a crystalline metallic-looking powder of a steel-grey colour. It is soluble in boiling hydrochloric acid, giving off sulphuretted hydrogen; the solution is precipitated when thrown into water, a white oxychloride of antimony being formed.

Off. Prep. Not used as a drug, but employed in the preparation of Antimonium Sulphuratum and Liquor Antimonii Chloridi.

ANTIMONIUM SULPHURATUM. Sulphurated Antimony.

Sulphide of Antimony, Sb_2S_3, with a small and variable amount of Oxide of Antimony, Sb_2O_3.

Prep. Ten ounces of purified black antimony (Sb_2S_3) are boiled for two hours with four and a half pints of solution of soda, with constant stirring and addition of water to maintain the same bulk, when the two substances act on one another, oxide of antimony and sulphide of sodium being formed (thus: $Sb_2S_3 + 6NaHO = Sb_2O_3 + 3Na_2S + 3H_2O$), and the sulphide of sodium combines with and dissolves some of the undecomposed sulphide of antimony, while the undecomposed soda does the same with the oxide of antimony.

The solution is strained through calico, and before it cools dilute sulphuric acid is added in slight excess, which decomposes the sulphide of sodium (thus precipitating the sulphide of antimony with the latter held in solution) and combines with the soda which retained the oxide of antimony, the latter being in great part reconverted into sulphide. The following decomposition explains part of the process:—

$$3Na_2S + Sb_2O_3 + 3H_2SO_4 = Sb_2S_3 + 3Na_2SO_4 + 3H_2O.$$

The precipitate is collected on a calico filter, the sulphate of sodium washed away with water, and the precipitate dried at a temperature not exceeding 212° F. (100° C.).

Prop. A bright orange or golden red powder, without odour and with slight taste; insoluble in water, almost entirely soluble in hydrochloric acid with evolution of sulphuretted hydrogen, a little sulphur remaining undissolved; it is also readily dissolved by caustic soda or potash. Sixty grains moistened and warmed with successive portions of nitric acid until red fumes cease to be evolved, and then dried and heated to redness, give a white residue weighing about 40 grains.

Off. Prep. It forms a part of Pilula Hydrargyri Subchloridi Composita.

Therapeutics. It possesses the same properties as other antimonial preparations, *vide* Antimonium Tartaratum; is rather uncertain in action from its slight solubility, and is seldom used except as an alterative in the compound calomel pill.

Dose. 1 gr. to 5 gr. as an alterative.

ANTIMONIUM TARTARATUM. Tartarated Antimony.

Synonym. Antimonii Potassio-Tartras. Often termed Tartar Emetic.

$K,SbO,C_4H_4O_6.H_2O$, an oxytartrate of antimony and potassium.

Prep. By mixing five ounces of oxide of antimony with six ounces of acid tartrate of potassium in fine powder, and a little water so as to form a paste, and setting the mass aside for twenty-four hours; afterwards boiling it in water for a quarter of an hour, filtering the solution, and allowing the clear filtrate to crystallise. In this process the following changes occur:—

$$Sb_2O_3 + 2KH,C_4H_4O_6 = 2K,SbO,C_4H_4O_6 + H_2O.$$

Prop. Colourless transparent crystals, exhibiting triangular faces (rhombic octahedra) with slight metallic taste. The crystals effloresce slightly in dry air; are soluble in water; partially soluble in proof spirit and insoluble in alcohol; they decrepitate and blacken upon the application of heat. The watery solution decomposes readily with the formation of algæ; is precipitated orange-red by sulphuretted hydrogen, not by ferrocyanide of potassium, chloride of barium, or nitrate of silver, unless the solution is concentrated. The watery solution gives a white precipitate of acid tartrate of potassium with hydrochloric acid, which is not formed if tartaric acid be previously added, as that salt is soluble in it. Twenty-nine grains dissolve slowly without residue in a fluid ounce of distilled water at 60° F. (15°·5 C.), and the solution gives with sulphuretted hydrogen an orange precipitate, which when washed and dried at 212° F. (100° C.), weighs 15·1 grains.

Off. Prep. **Vinum Antimoniale.** *Antimonial Wine.* (Tartarated antimony, forty grains; sherry, twenty ounces.) Two grains of the salt are contained in each ounce of the wine.

Unguentum Antimonii Tartarati. *Ointment of Tartarated Antimony.* (Tartarated antimony, in fine powder, a quarter of an ounce; simple ointment, one ounce.)

Therapeutics. Internally, in small doses, tartar emetic acts on the skin and mucous membranes, and is diaphoretic, expectorant, and probably cholagogue. In larger doses it acts at first as an emetic, sometimes as a purgative; if continued, tolerance becomes established, and it then produces a powerful sedative effect upon the vascular system (not the heart especially) and upon all the muscles. Externally it is powerfully irritant, and produces pustules having the character of those in variola; occasionally when thus applied it becomes absorbed, and hence may be dangerous in very young subjects.

Tartar emetic is used in febrile affections to promote secretions; in severe inflammation, as in acute pneumonia and bronchitis, as a vascular depressant; also before the introduction of chloroform, to produce muscular relaxation in the reduction of dislocations; not unfrequently as an addition to purgative medicines. It is employed as an emetic, being adapted to cases in which depression of the circulation is not objectionable. At the present time the preparations of antimony are comparatively little used: the author does not remember to have prescribed them for some years, whereas formerly he was in the habit of seeing them daily administered in various inflammatory diseases; so great is the change of opinion with regard to the use of vascular depressants which has taken place in the mind of the medical profession: it is possible the revulsion has been too great, and that antimonial salts might be advantageously given in some forms of disease.

Externally, in the form of ointment, or hot aqueous solution, tartar emetic is used as a powerful counter-irritant in head and abdominal affections, also over diseased joints, and other chronically inflamed parts.

Dose. Of tartar emetic; as a diaphoretic, expectorant, &c. $\frac{1}{16}$ gr. to $\frac{1}{6}$ gr.; as a vascular depressant or sedative, $\frac{1}{6}$ gr. to 2 gr.; as an emetic, 1 gr. to 2 gr.

The wine is objectionable in cases where large doses of the salt are required for its depressant effect, but is a useful form for administration in doses of 5 min. to 1 fl. drm. in febrile affections, &c.

Incompatibles. Acids, alkalies, and their carbonates, cause precipitates in the solutions of this salt; also some earthy and metallic preparations, as those of calcium, lead, &c.; but caustic alkalies in excess re-dissolve the precipitate. Astringent vegetable infusions throw down an insoluble tannate of antimony.

Adulteration. Cream of tartar is the only adulteration likely to be met with; this can be detected by its being less soluble in water than tartar emetic, and by finding that upon the addition of a small quantity of carbonate of soda to a boiling solution of the suspected salt, the precipitated oxide of antimony, which is at first thrown down, becomes re-dissolved from the presence of the free acid of the acid tartrate of potassium. Iron is sometimes present.

ANTIMONII OXIDUM. Oxide of Antimony. Sb_2O_3.

Prep. This is prepared by pouring a solution of terchloride of antimony into water, and treating the resulting precipitate of oxychloride of antimony with carbonate of sodium, by which means oxide of antimony and chloride of sodium are formed. The oxide is afterwards washed and dried at a heat not exceeding 212° F. (100° C.).

Prop. A white powder, fusible at a low red heat, and readily dissolved by hydrochloric acid. The solution, dropped into distilled water, gives a white deposit, changed to orange yellow by sulphuretted hydrogen. Oxide of antimony does not yield any sublimate when fused in a test tube, showing the absence of arsenious acid; and it dissolves entirely when boiled with an excess of the acid tartrate of potassium.

Off. Prep. **Pulvis Antimonialis.** *Antimonial Powder.* (Oxide of antimony, one ounce; phosphate of calcium, two ounces.) This is intended as a substitute for "James' Powder."

Therapeutics. The oxide of antimony is analogous in its action to tartar emetic; but on account of the slowness with which it dissolves in the stomach, it is less likely to cause local irritation, and it may be employed with advantage when the diaphoretic and slightly alterative effects of antimony are required.

Dose. Of oxide of antimony, 1 gr. to 4 gr.; of antimonial powder, 3 gr. to 5 gr.

LIQUOR ANTIMONII CHLORIDI. Solution of Chloride of Antimony. Terchloride of antimony ($SbCl_3$), dissolved in hydrochloric acid.

Prep. Made by dissolving one pound of purified black antimony in four pints of hydrochloric acid with the aid of heat, and reducing the solution to two pints.

Prop. & Comp. A heavy liquid, of a yellowish-red colour; sp. gr. 1·47. A little of it dropped into water gives a white precipitate of oxychloride, which becomes orange when treated with sulphuretted hydrogen. The solution, filtered from the white precipitate, gives rise to a copious deposit when treated with nitrate of silver. These reactions show that antimony and chlorine are present in the solution. One drachm, mixed with a solution of a quarter of an ounce of tartaric acid in four ounces of water, gives a precipitate with sulphuretted hydrogen, which, when washed and dried at 212° F. (100° C.), weighs at least twenty-two grains, indicating the amount of antimony.

Therapeutics. The solution of chloride of antimony is a powerful caustic and escharotic. It is applied sometimes to cancerous growths, and also to poisoned wounds, to the bites of venomous serpents, &c. It is never administered internally, but is used in the preparation of the oxide of antimony.

ARGENTUM. SILVER.

(Ag. Eq. = 108.)

ARGENTUM PURIFICATUM. Refined Silver.

Silver, in its metallic state, is not used in medicine, except as a coating for pills, but is introduced into the Pharmacopœia for the purpose of making the nitrate of silver; when pure, it is very white and malleable, sp. gr. 10·50; it is acted on readily by sulphuretted hydrogen in the presence of moisture, and becomes black, but is not oxidised in the air; it is soluble in nitric acid. Silver leaf is the form made use of if the metal is employed as a test. If ammonia be added in excess to a solution of the metal in nitric acid, the resulting fluid exhibits neither colour nor turbidity.

ARGENTI NITRAS. Nitrate of Silver. $AgNO_3$.

Prep. Three ounces of refined silver are dissolved by the aid of a gentle heat in two fluid ounces and a half of nitric acid, previously diluted with five ounces of water ; the clear solution is then evaporated and allowed to crystallise.

Prop. In colourless right rhombic prisms : when fused, in the form of small white pencils or sticks, crystalline in structure. It is soluble in water and in rectified spirit. It gives a copious white precipitate with hydrochloric acid, which becomes dark by exposure to light ; soluble in solution of ammonia, but not in nitric acid. A small fragment heated on charcoal with the blowpipe, first melts and then deflagrates, leaving behind a dull white metallic coating. Ten grains dissolved in distilled water give with hydrochloric acid a precipitate which when washed and dried weighs 8·44 grains, and the filtrate when evaporated by a water bath leaves no residue ; indicating the proper amount of the metal, and the absence of impurities. It stains the skin black, and forms insoluble compounds with animal tissues. It should be kept from the light.

Off. Prep. **Argenti et Potassii Nitras.** *Nitrate of Silver and Potassium : Mitigated Caustic.* Prepared by fusing one part of nitrate of silver with two parts of nitrate of potassium, and casting the mixture in the form of pencils or cones.

Therapeutics. Externally it is astringent, irritant, vesicant, or even escharotic, according to the mode of its application ; it may be used in solution of the strength of from half a grain to half a drachm to the fluid ounce, or in the solid form. Internally, in small doses, it acts as an astringent and alterative to the mucous membrane of the stomach and intestines, is absorbed and produces remote astringent effects, and also influences the nervous system as a tonic ; when long continued, it may stain the surface of the body of a blue or leaden hue, from the reduction of the metal and its deposition on the surface of the true skin, but such an effect has not been known to occur under less than three months' continuous use of the drug, often not till after a year.

Externally it is used to poisoned wounds, pustules, ulcers (venereal and other), and erysipelatous inflamed parts ; also to diminish or destroy morbid growths; occasionally it is rubbed on the skin, to produce vesication. Mitigated caustic is often used by oculists and others. In solutions of different strengths, it is used as a lotion, injection, or collyrium.

Internally, it is often of great value in gastric affections of a chronic inflammatory character, accompanied by gastrodynia, pyrosis, or vomiting, and even in organic and malignant diseases of the stomach it often gives much temporary relief; it is likewise useful in some cases of diarrhœa: from its action on the nervous system it has been largely used in the treatment of epilepsy, and frequently with considerable effect in checking the number of fits, especially before the value of bromides in these cases was known; sometimes it is given in chorea.

Dose. $\frac{1}{6}$ gr. to $\frac{1}{3}$ gr. or more, made into a pill with a crumb of bread or some ingredient which does not decompose the salt. Patients should always be cautioned not to take silver salts for too long a period.

Incompatibles. Its solution should be made with distilled water, as the chlorides decompose the silver salt; nitrate of silver is seldom given in the form of solution on account of its very disagreeable taste, and its decomposing almost all vegetable infusions which could be prescribed with it; probably the chloride of silver and other insoluble compounds would act as therapeutic agents.

Adulteration. It is apt to contain copper and lead: if copper, its solution, after complete precipitation by common salt, will be blackened by sulphuretted hydrogen; if lead, the precipitate formed by the addition of common salt is not entirely dissolved by ammonia.

ARGENTI OXIDUM. Oxide of Silver. Ag_2O.

Prep. A solution of half an ounce of nitrate of silver in four fluid ounces of distilled water, is poured into three and a half pints of lime water, and the mixture well shaken, and set aside to allow the deposit to settle; the supernatant fluid having been drawn off, the deposit should be collected on a filter, washed with distilled water, and afterwards dried at a temperature not exceeding 212° F. (100° C.), and kept in stoppered bottle.

In this process, the change is one of simple transfer of the nitric acid from the silver to the calcium.

Prop. A dark olive-brown powder, becoming black by age;

insoluble in water, but soluble in ammonia and likewise in nitric acid without the evolution of any gas, forming a solution with the characteristics of nitrate of silver; readily decomposed by heat, and even by the action of light, when long continued, into metallic silver and oxygen.

Twenty-nine grains of oxide of silver yield 27 grains of metallic silver when heated to redness. The molecular equivalent of the oxide is 232, and of metallic silver 216; and 232 is to 216 as 29 to 27.

Therapeutics. Very similar to the nitrate, except that the topical action is slight; after absorption, its effects are probably the same. It has been asserted to be a very valuable astringent in hæmorrhages. It may be used when the remote action of silver is required, as in diseases of the nervous system, as a nervine tonic, and in dyspepsia on account of its influence on the mucous surface of the stomach.

Dose. ½ gr. to 2 gr., in the form of pill.

Incompatibles. Oxide of silver, from the readiness with which it parts with its oxygen, decomposes many organic substances. It is particularly incompatible with creasote, with which it forms a compound liable to spontaneous combustion.

CHLORIDE OF SILVER has also been given as a remedy; its action is probably similar to that of the oxide.

ARSENICUM. ARSENIC.

(As. Eq. = 75.)

Arsenic occurs chiefly in the form of arseniuret of iron, nickel, or cobalt. Metallic arsenic is not employed in medicine; when pure, it is dark steel-coloured, with metallic lustre, crystalline, and brittle; sp. gr. 5·8; very volatile, and when heated gives off an odour like garlic; it forms two oxides, and combines readily with sulphur.

ACIDUM ARSENIOSUM. Arsenious Acid; Anhydrous Arsenious Acid; White Arsenic. As_2O_3.

Prep. Usually collected in flues during the smelting of the arseniurets, and afterwards purified by introducing some of the commercial arsenious acid into a thin porcelain capsule, and covering the capsule with a glass flask filled with cold water and fitting pretty closely, then applying the heat of a lamp. The arsenious acid being volatile, rises in the form of vapour, and is condensed on the bottom of the flask.

Prop. The commercial article usually occurs in broken pieces of the cakes, into which it has been sublimed ; it is transparent and glass-like at first, but after a time becomes opaque white or yellowish.

The medicinal acid, or that which has been resublimed by the above process, is in the form of a crystalline, heavy, white powder; soluble sparingly in cold water (the amorphous being more soluble than the crystalline variety)—much more in boiling water, which, on cooling, deposits octahedral crystals of the acid ; when sublimed slowly in a tube, the same octahedral crystals are seen. When mixed with charcoal and heated, metallic arsenic sublimes with an alliaceous odour. The solution of arsenious acid is precipitated yellow by sulphuretted hydrogen, and lemon or canary-yellow colour by ammonio-nitrate of silver, insoluble in water, but soluble in ammonia and nitric acid, and green with sulphate of copper, after the addition of potash.

Tests for purity. It is entirely volatilised by a heat of 400° F. (204°·4 C.). Four grains dissolved in boiling water with about twenty grains of bicarbonate of sodium, discharge the colour of 808 grain-measures of the volumetric solution of iodine. This decolorization is effected by the conversion of the iodine into hydriodic acid. The change may be represented by the formula, $\mathbf{As_2O_3+2H_2O+4I=As_2O_5+4HI}$, four equivalents of iodine corresponding to one equivalent of arsenious acid.

Off. Prep. **Liquor Arsenicalis.** *Arsenical Solution.* A mixed solution of arsenite and carbonate of potassium.

Synonym. Liquor Potassæ Arsenitis. Fowler's Solution.

(Arsenious acid in powder, carbonate of potassium, of each eighty-seven grains ; compound tincture of lavender, five fluid drachms ; distilled water, a sufficiency. Boil the acid and carbonate with half a pint of water, until they are dissolved. To the cold liquor add the tincture ; and lastly, as much water as may make up a pint. A reddish liquid, alkaline to test paper, and having the odour of lavender. When acidulated with hydrochloric acid, it gives, with sulphuretted hydrogen, a yellow precipitate, brightest when the arsenical solution has been previously diluted. One fluid ounce boiled for five minutes with ten grains of bicarbonate of sodium, and then diluted with six fluid ounces of water to which a little mucilage of starch has been added, does not give with the volumetric solution of iodine a permanent blue colour, until 875 grain-measures have been added, representing one per cent. of arsenious acid or rather more than 4 grains (4⅓) in one fluid ounce. The explanation of this test is the same as that given under the head of arsenious acid itself. The addition of the starch ensures the detection of free iodine more readily.

Therapeutics. Acute arsenical poisoning may present at least two forms; in the one, the symptoms are those of intense gastro-intestinal irritation; in the other, the action of the poison seems to be concentrated upon the nervous centres, while the alimentary canal escapes. Besides the post-mortem changes in the stomach and intestines, fatty degeneration of the liver, kidneys, voluntary muscles, and other organs, may be found. Chronic poisoning by arsenic presents a long and varied series of phenomena; it is not met with as a consequence of the medicinal use of the drug, but only among workmen who are habitually exposed to its influence, or in persons who are accidentally subjected to it (arsenical wall-papers, &c.). It is undoubtedly possible for certain constitutions to become used to the poison; the arsenic-eaters of Styria, beginning with minute doses, are ultimately able to swallow five grains of arsenious acid at a time. The effects produced upon them are said to be favourable; increased muscular energy, improved nutrition and colour, and augmented respiratory power, being among the principal ones. In minute doses the effects of arsenic appear to be directed to the skin and nervous system, being alterative and tonic in their nature: in larger doses, irritation of the alimentary canal and of the mucous membrane of the eyes is produced; in still larger ones, poisonous effects ensue: externally, it acts as an escharotic, and may be absorbed to a dangerous extent. In medicinal doses it is said to check oxidation and tissue-change; it is chiefly eliminated in the urine, though some of it accumulates in the liver, spleen, and elsewhere. It has been found in nearly all the secretions except the milk. Arsenic is employed:

1°. In certain forms of skin-disease, not of syphilitic origin. In chronic eczema and psoriasis, in relapsing pemphigus and lichen ruber, the drug acts as a specific.

2°. As an antiperiodic. Excepting, perhaps, the preparations of cinchona bark, there is no agent so potent in the cure of intermittent fever, and periodic forms of neuralgia. Arsenic sometimes succeeds when quinine has failed.

3°. Arsenic cures some forms of neuralgia which cannot be attributed to malaria

4°. It is a most valuable remedy in chorea, and has been employed in the treatment of epilepsy.

5°. It has been advantageously given in some forms of chronic pulmonary disease; its good effects being perhaps due to its improving the general state of the patient's nutrition.

Dose. Of arsenious acid $\frac{1}{60}$ gr. to $\frac{1}{24}$ gr., or $\frac{1}{12}$ gr. Of arsenical solution, 2 min. to 5 min., or occasionally to 10 min. Preparations of arsenic should be given soon after a meal, and pain in the epigastrium, nausea, and irritation of the eyelids, should be looked upon as indications for diminishing the dose.

Adulteration. Gypsum and chalk, which have been sometimes mixed with arsenious acid, can be readily detected by not subliming with heat.

LIQUOR ARSENICI HYDROCHLORICUS. Hydrochloric Solution of Arsenic.

(Arsenious acid in powder, eighty-seven grains; hydrochloric acid, two fluid drachms; water, a sufficiency. Boil the hydrochloric acid and arsenic with four ounces of the water, and add water till the bulk is a pint.)

Prop. A colourless liquid, with an acid reaction. Sp. gr. 1·01. Gives a yellow precipitate with sulphuretted hydrogen. A fluid ounce boiled for five minutes with twenty grains of bicarbonate of sodium, and then diluted with six fluid ounces of distilled water, to which a little mucilage of starch has been added, does not give with the volumetric solution of iodine a permanent blue colour, until 875 grain-measures have been added, corresponding to 1 per cent. of arsenious acid, or to rather more than 4 grains ($4\frac{1}{3}$) in each fluid ounce.

Therapeutics. Some practitioners regard this solution as a milder preparation than that of the arsenite of potassium; from many observations made by the author, he has come to the conclusion that there is no ground for such opinion; in cases in which the ordinary arsenical solution caused disturbance, the same amount of arsenic given in the form of the hydrochloric solution always produced the same symptoms.

Dose. 2 min. to 8 min.

SODII ARSENIAS. Arseniate of Sodium. $Na_2HAsO_4 12H_2O$; and $Na_2HAsO_4,7H_2O$.

Prep. Made by finely powdering and intimately mixing together ten ounces of arsenious acid, eight and a half ounces of nitrate of sodium, and five and a half ounces of dried carbonate of sodium, afterwards putting the mixture into a large clay crucible covered with a lid, and exposing it to a full red heat, till effervescence has ceased and complete fusion has taken place. While still warm it is dissolved in boiling water, and then set aside to crystallise. In this process the arsenious acid gets oxidised at the expense of the nitric acid, and combines with the sodium; carbonic acid and nitric oxide escape.

Prop. In colourless transparent prisms, soluble in water, the solution giving a brick-red precipitate with nitrate of silver ($\mathbf{Ag_3AsO_4}$), and a white precipitate with chloride of barium, chloride of calcium, and sulphate of zinc, all of which precipitates are soluble in nitric acid. The precipitate with silver is also soluble in excess of ammonia. Arseniate of sodium heated to 300° F. (148°·9 C.) loses 53·73 per cent. of its weight, becoming anhydrous. On exposure of the ordinary salt, moisture escapes, the effloresced salt having the formula $\mathbf{Na_2HAsO_47H_2O}$. A watery solution of 12·4 grains of anhydrous arseniate of sodium acidulated with acetic acid, requires not less than 34 grains of acetate of lead for complete precipitation.

Off. Prep. **Liquor Sodii Arseniatis.** *Solution of Arseniate of Sodium.* (Arseniate of sodium, rendered anhydrous by a heat not exceeding 300° F. (148°·9 C.), nine grains; distilled water, two fluid ounces.) Strength, one per cent.

Therapeutics. Arseniate of sodium may be employed in the same cases as arsenious acid or the arsenical solution. The author has made many observations upon this salt, and considers it one of considerable value; from his trials he came to the conclusion that, measured by the amount of metal, its action is milder than arsenious acid, less liable to produce irritation of the mucous membranes, and equally effectual in its constitutional effects. See Therapeutics of Arsenious Acid.

Dose. Of the crystallised salt, $\frac{1}{16}$ gr. to $\frac{1}{8}$ gr.; of solution of arseniate of sodium, 5 min. to 10 min. or more. Some patients are very intolerant of arsenic, and much smaller doses must then be administered.

FERRI ARSENIAS. Arseniate of Iron. *See* Iron Salts.

ARSENII IODIDUM. Iodide of Arsenium. $\mathbf{AsI_3}$.

Prep. By the direct union of iodine and metallic arsenium, or by evaporating to dryness an aqueous mixture of arsenious and hydriodic acids.

Prop. An orange-red powder or small orange-coloured crystals, soluble in water and in rectified spirit. The aqueous solution gives a yellow precipitate with sulphuretted hydrogen. On being heated in a test tube it is volatilised almost entirely, violet vapours of iodine being disengaged.

Use. It is employed in the preparation of liquor arsenii et hydrargyri iodidi.

Therapeutics. Occasionally employed in the treatment of chronic cutaneous affections, as in psoriasis and chronic eczema.

Dose. $\frac{1}{30}$ gr.

LIQUOR ARSENII ET HYDRARGYRI IODIDI. Solution of Iodide of Arsenium and Mercury; Donovan's Solution.

Prep. Iodide of arsenium, red iodide of mercury, each, forty-five grains; distilled water, a sufficient quantity. Triturate the iodides with about an ounce and a half of distilled water until nearly all is dissolved. Pass through a filter and wash the latter with sufficient water to produce ten fluid ounces of solution.

Prop. A very pale yellow liquid, having no odour, but a styptic taste; sp. gr. 1·016. Sulphuretted hydrogen gives a precipitate partially insoluble in strong nitric acid; the dissolved portion, when diluted, yields a yellow precipitate on the gradual addition of solution of sulphydrate of ammonium. It contains about 1 per cent. by weight of arsenious iodide, $\mathbf{AsI_3}$, and of mercuric iodide, $\mathbf{HgI_2}$.

Therapeutics. It has been used chiefly in obstinate skin affections, and seems occasionally to be useful when other preparations of arsenium fail; it is peculiarly applicable to those depending on venereal taint. Externally, freely diluted, it has been used as a lotion in similar cases.

Dose. 10 min. to ½ fl. drm. diluted, and given with the precautions enjoined for the other preparations of arsenic

BISMUTHUM. BISMUTH.

(**Bi.** Eq. = 209.)

BISMUTHUM. Bismuth.

Description. A pinkish-white metal, occurring native, fusing readily, and crystallising in cubes or octahedra; sp. gr. 9·8; soluble in nitric acid, precipitated by water: introduced for the formation of the nitrate.

BISMUTHUM PURIFICATUM. Purified Bismuth.

Prep. Bismuth, ten ounces; cyanide of potassium, half an ounce; sulphur, eighty grains; carbonate of potassium and carbonate of sodium, both recently ignited, of each a sufficiency. Melt the bismuth in a crucible and heat it to low redness with the cyanide of potassium and the sulphur. Separate the purified bismuth from the slag and remelt it with about five per cent. of a mixture of equal parts of the dried carbonates of potassium and sodium, heating to bright redness and constantly stirring. Remove the crucible from the fire, cool, and pour out the bismuth into suitable moulds.

BISMUTHI OXIDUM. Oxide of Bismuth. Bi_2O_3.

Prep. By boiling one pound of the subnitrate of bismuth with four pints of solution of soda. The liquid is decanted from the precipitated oxide; the latter is then washed with distilled water, and dried on a water-bath.

Prop. A dull lemon-yellow powder. Does not lose weight by being heated to redness. Insoluble in water; soluble in nitric acid mixed with half its volume of water; if it be thus dissolved to saturation, the solution mixed with ten or twenty times its volume of water yields a white precipitate of the subnitrate. The nitric acid solution gives no precipitate with dilute sulphuric acid or nitrate of silver. Solution of chloride of ammonium added to the nitric acid solution gives a white precipitate, and if this be treated with excess of solution of ammonia, then filtered, and the clear filtrate neutralised with hydrochloric acid, it will not become turbid.

Therapeutics. Similar to the carbonate of bismuth (*quod vide*).

Dose. 5 gr. to 15 gr.

BISMUTHI SUBNITRAS. Subnitrate of Bismuth. White Bismuth. $BiONO_3,H_2O$.

Prep. By dissolving two ounces of purified bismuth (in coarse powder) in four fluid ounces of nitric acid, diluted with three ounces of water, aiding the solution by heat; when the effervescence has ceased, decanting from impurities, evaporating the liquor to two fluid ounces, and pouring it into half a gallon of water, decanting the supernatant fluid from the precipitate which subsides, washing the sediment by agitation with water, and drying on a filter at a temperature of 150° F. (65°·5 C.).

The acid solution of nitrate of bismuth ($Bi(NO_3)_3$) when poured into water, lets fall a white precipitate, chiefly composed of subnitrate of bismuth; its composition is somewhat altered by washing.

Prop. A heavy white powder, in minute crystalline scales, blackened by sulphuretted hydrogen. It is insoluble in water, dissolves in nitric acid mixed with half its volume of distilled water, and the solution poured into water gives a white crystalline precipitate; dissolved in sulphuric acid, diluted with an equal bulk of water, it forms a solution which is blackened by sulphate of iron, showing the presence of nitric acid. The solution in nitric acid gives no precipitate with dilute sulphuric acid, nor with nitrate of silver.

Off. Prep. **Trochisci Bismuthi.** *Bismuth Lozenges.* (Sub-nitrate of bismuth, fourteen hundred and forty grains; carbonate of magnesium, four ounces; precipitated carbonate of calcium, six ounces; refined sugar, twenty-nine ounces; gum acacia in powder, one ounce; mucilage of gum acacia, two fluid ounces; rose-water a sufficiency; to make 720 square lozenges.) Each lozenge contains two grains of the salt of bismuth.

Therapeutics. Subnitrate of bismuth, when taken internally, acts upon the mucous membrane of the stomach and intestines as a direct sedative; a portion of it is dissolved and promptly absorbed, deeply impregnating the tissues; it has been discovered in some of the secretions, by which it is very slowly eliminated; much of it, however, passes through the alimentary canal, and becoming blackened in its passage by the action of sulphuretted hydrogen, imparts its colour to the fæces. The remote physiological action of bismuth is at present unknown. Subnitrate of bismuth is employed largely in the treatment of irritative forms of dyspepsia, more especially when pyrosis is a prominent symptom, and pain occurs an hour or more after food; it is also useful in some other forms of gastralgia, and in chronic vomiting; whether functional, or depending upon ulcer of the stomach. Subnitrate of bismuth has likewise been proposed to check diarrhœa, and was stated by Dr. Theophilus Thompson to be of much value in the diarrhœa of phthisis.

Bismuth has been also given in some nervous diseases, as epilepsy; and it is stated to have been occasionally of service: the author has tried it in a few cases of epilepsy, but without obtaining any benefit from it.

Externally, the subnitrate of bismuth has been used as a local sedative application in some skin affections, also in leucorrhœa and gleet. This salt has likewise been largely used as a cosmetic; the vapours of sulphuretted hydrogen, such as arise from the sulphurous mineral waters, are apt to blacken the face if so used.

Dose. 5 gr. to 20 gr. in powder; or suspended by means of mucilage of gum arabic or tragacanth. Of the lozenges, from 1 to 6.

Adulteration. Carbonate of lead, a dangerous addition, known by the tests given above; this salt effervesces with nitric acid, and the solution is precipitated by sulphuric acid. Arsenic has been occasionally detected by the sublimation of arsenious acid when the preparation is heated, and by the other tests given under that metal.

BISMUTHI CITRAS. Citrate of Bismuth. $\mathbf{BiC_6H_5O_7}$.

A salt of bismuth, soluble in ammonia, prepared from a solution of subnitrate of bismuth in nitric acid, by the addition of a solution of bicarbonate of sodium and citric acid.

Employed in the preparation of the Liquor Bismuthi et Ammonii Citratis. If given internally, the dose is 2 gr. to 5 gr.

LIQUOR BISMUTHI ET AMMONII CITRATIS. Solution of Citrate of Bismuth and Ammonium.

Prep. Citrate of bismuth, eight hundred grains; solution of ammonia, and distilled water, of each a sufficiency. Rub the citrate of bismuth with a little water to form a paste; add ammonia gradually, and with stirring, until the salt is just dissolved, and dilute with distilled water to the volume of one pint.

Prop. A colourless solution, with a saline and slightly metallic taste. Sp. gr. 1·07. Neutral or slightly alkaline. Miscible with water without undergoing decomposition; heated with alkalies, ammonia is evolved and a white precipitate formed of oxide of bismuth. Hydrochloric acid gives a white precipitate soluble in excess. One fluid drachm contains an amount of bismuth equivalent to about three grains of oxide of bismuth.

Off. Prep. **Bismuthi et Ammonii Citras.** *Citrate of Bismuth and Ammonium.* (Solution of citrate of bismuth and ammonium evaporated and dried in thin layers on glass at a temperature not exceeding 100° F. (37°·8 C.).) Thus prepared it forms small, shining, translucent scales.

Therapeutics. This has been proposed as a soluble bismuth preparation, and it appears to possess the same properties as the subnitrate, and may be employed in the same cases. Some practitioners regard it as more powerful than the subnitrate, and attribute this superiority to the soluble condition of the metal; comparative trials are at present wanting.

Dose. Of the liquor $\frac{1}{2}$ fl. drm. to 1 fl. drm. in water, or some other menstruum; of citrate of bismuth and ammonium, 2 gr. to 5 gr.

BISMUTHI CARBONAS. Carbonate of Bismuth. $(Bi_2O_2CO_3)_2,H_2O$.

Prep. Add the solution of nitrate of bismuth, as produced above in the preparation of the subnitrate, to a solution of six ounces of carbonate of ammonia in two pints of distilled water, constantly stirring, when the carbonate is precipitated ; this must be washed and dried at a temperature not above 150° F. (65°·5 C.).

Prop. A fine, white powder, blackened by sulphuretted hydrogen ; insoluble in water, but soluble with effervescence in nitric acid. If to nitric acid, mixed with half its volume of distilled water, carbonate of bismuth is added to saturation, one volume of this solution, poured into twenty volumes of water, will yield a white precipitate, chiefly composed of subnitrate of bismuth. The nitric acid solution gives no precipitate with dilute sulphuric acid, or with solution of nitrate of silver. When added to sulphuric acid, coloured with sulphate of indigo, the colour of the latter is not discharged.

Therapeutics. Carbonate of bismuth probably acts in the same manner as the subnitrate ; it is more soluble in the secretion of the stomach, and perhaps on this account may cause a more powerful action upon the mucous membrane, but no trustworthy comparative clinical observations have been yet recorded.

Dose. 5 gr. to 20 gr.

CADMIUM.

(Cd. Eq. = 112.)

Cadmium is a metal of a white colour, resembling tin, and a bar of it creaks when it is bent in the same manner as tin. It is found as a sulphide, in combination with some ores of zinc. Sp. gr., 8·6.

CADMII IODIDUM. Iodide of Cadmium. CdI_2. Is formed by the direct union of iodine and cadmium in the presence of water. (Not official.)

Prop. It occurs in white flat micaceous crystals, having a pearly lustre ; is freely soluble in water and rectified spirit ; the solution being acid to litmus paper. The crystals melt at about 600° F. (315°·6 C.) into an amber-coloured fluid, and give off violet-coloured vapours at a dull red heat. The watery solution is precipitated yellow (cadmium yellow, a pigment) with sulphuretted hydrogen or sulphide of ammonium ; the precipitate is insoluble in excess of the latter ; precipitated in a white jelly with excess of potash, and the filtered fluid not affected by sulphide of ammonium. A solution of ten grains in water gives with an excess of nitrate of silver, a precipitate, which after being washed with water, and then with half an ounce of solution of ammonia, and dried, weighs 12·5 grains.

Prep. Unguentum Cadmii Iodidi. Ointment of Iodide of Cadmium. (Iodide of cadmium in fine powder, sixty-two grains ; simple ointment, an ounce ; mix.)

Therapeutics. Iodide of cadmium is not given as an internal remedy, but when in the form of an ointment it forms an efficient preparation, which may be used in the same cases, and has the same action as the iodide of lead ; while the staining which the latter salt produces is not produced by the cadmium salt ; this fact renders the iodide of cadmium a desirable remedy when we wish to avoid the production of any yellow disfiguration. Cadmium, when absorbed into the system, is not known to produce injurious effects, as is the case with lead. The ointment above mentioned often causes irritation of the skin, and requires to be diluted with lard or some other bland substance.

SULPHATE OF CADMIUM resembles in appearance sulphate of zinc ; it is crystalline and soluble in water ; in large doses it produces vomiting ; it is said to possess anti-syphilitic properties, and applied in solution topically acts as an astringent and irritant, and may be used for the same purposes as the sulphate of zinc. Its action is said to be ten times more powerful ; it is not official.

CALCIUM.

(Ca. Eq. = 40.)

Calcium is the metallic base of lime ; it occurs, when pure, as a white metal, which, when heated, oxidises rapidly and is converted into lime.

CALX. Lime, recently prepared from Chalk. **CaO.**

Prep. Lime, or quick-lime, is made from chalk or carbonate of calcium by strongly heating it, so as to drive off the carbonic acid.

Prop. In whitish masses, quite white when pure ; of a caustic taste ; it rapidly absorbs water, and when two-thirds of its weight of water are poured upon it, it slakes rapidly with development of much heat, and is converted into a snow-white and very bulky powder. About 11 grains are dissolved by a pint of water at

60° F. (15°·5 C.); it is less soluble in boiling water; sugar greatly increases its solubility. The solution of lime has an alkaline reaction, and yields a white precipitate with oxalate of ammonium; it soon absorbs carbonic acid if exposed to the air. Lime, if previously slaked, dissolves in dilute hydrochloric acid without effervescence, and if this solution be evaporated to dryness, and the residue re-dissolved in water, only a very scanty precipitate forms on the addition of saccharated solution of lime, showing the absence of more than traces of alumina and magnesia.

Off. Prep. **Calcii Hydras.** *Slaked Lime,* $Ca(HO)_2$, *with some impurities.* Recently prepared lime slaked with water.

Liquor Calcis. *Solution of Lime; Lime Water.* (Slaked lime, two ounces; distilled water, a sufficiency. Wash the slaked lime with some of the water until a little of the filtered liquid, after being acidified with nitric acid, gives no turbidity with solution of nitrate of silver. Put the washed lime into a bottle containing one gallon of water, and shake well; when it is to be used, draw off the clear solution with a syphon.) Ten fluid ounces require for neutralisation 180 grain-measures of the volumetric solution of oxalic acid, which correspond to about five grains of lime (CaO); or about half a grain to the ounce.

Liquor Calcis Saccharatus. *Saccharated Solution of Lime.* (Slaked lime, one ounce; refined sugar in powder, two ounces; distilled water, twenty fluid ounces.) Sp. gr., 1·052. One fluid ounce requires for neutralisation 254 grain-measures of the standard solution of oxalic acid, which correspond to 7·11 grains of lime.

Linimentum Calcis. *Liniment of Lime.* (Lime-water, olive oil, each, two fluid ounces; shake them together, until they are mixed.) Carron oil consists of equal parts of lime-water and linseed oil.

Therapeutics. Lime is only given as liquor calcis, which acts as an antacid both on the intestinal canal, and, after absorption, on the blood and secretions. It differs, however, from potash and soda, in being astringent or desiccative, diminishing secretion, and hence is very useful in diarrhœa connected with acidity, and in some cases of dyspepsia; it is mostly employed for infants; it has also been used in certain calculous affections, but the urate of calcium is a very insoluble salt, requiring 2860 parts of water at 100° F. (37°·8 C.), to dissolve it.

Externally applied, lime acts as a caustic, or much diluted, as a desiccant, and is applied to burns in the form of linimentum calcis. It forms the basis of depilatories.

Dose. Of solution of lime, or lime-water, 1 fl. oz. to 4 fl. oz., with milk, &c.; of saccharated solution of lime, 15 min. to 1 fl. drm.

Adulteration. Lime and liquor calcis are apt to contain carbonic acid and metallic impurities, which can be detected by the tests given above.

CALCII CARBONAS PRÆCIPITATA. Precipitated Carbonate of Calcium. **$CaCO_3$.**

Prep. Dissolve five ounces of chloride of calcium and thirteen ounces of carbonate of sodium, each in two pints of boiling water, and mix, when carbonate of calcium and chloride of sodium are formed; the former subsides, is washed, and dried at 212° F. (100° C.).

Prop. A white crystalline powder, in other respects corresponding with creta præparata. (Contained in Trochisci Bismuthi.)

MARMOR ALBUM. White Marble. **$CaCO_3$.** Hard white crystalline native carbonate of calcium, in masses. Used in producing carbonic acid gas.

CRETA. Chalk; Native friable Carbonate of Calcium. Used in producing carbonic acid gas.

CRETA PRÆPARATA. Prepared Chalk. Chalk reduced to a very fine powder and elutriated.

Prop. In white powder, or small friable masses, tasteless, insoluble in water; entirely soluble, with effervescence, in dilute hydrochloric acid. This solution, when supersaturated with ammonia, gives a copious white precipitate with oxalate of ammonium; saccharated solution of lime added to a neutral solution gives no or scarcely a trace of precipitate, indicating the absence of silica, common metallic impurities, alumina, or magnesia.

Off. Prep. **Mistura Cretæ.** *Chalk Mixture.* (Prepared chalk, a quarter of an ounce; gum acacia, in powder, a quarter of an ounce; syrup, half a fluid ounce; cinnamon water, seven fluid ounces and a half.)

Pulvis Cretæ Aromaticus. *Aromatic Powder of Chalk.* (Cinnamon bark, four ounces; nutmeg and saffron, each three ounces; cloves, one and a half ounces; cardamom seeds, one ounce; refined sugar, twenty-five ounces; all in powder; prepared chalk, eleven ounces.)

Pulvis Cretæ Aromaticus cum Opio. (*See* Opium.)
Prepared chalk is also contained in hydrargyrum cum cretâ.

Therapeutics. Chalk acts as an antacid and astringent on the intestinal canal; a little becomes absorbed and produces the remote effects of lime. It is used chiefly in diarrhœa, alone or combined with other astringents and aromatics. Chalk should not be given for too long a time, as when it ceases to meet with acidity in the intestinal canal it is apt to cause concretions which may lead to much discomfort. The action of precipitated carbonate of lime is the same as that of chalk.

Dose. Of precipitated carbonate of calcium, and of prepared chalk, 10 gr. to 60 gr.; of chalk mixture, 1 fl. oz. to 2 fl. oz.; of aromatic powder of chalk, 10 gr. to 60 gr.

Adulteration. The same for chalk as for lime, detected by the above tests.

CALCII CHLORIDUM. Chloride of Calcium. $CaCl_2, 2H_2O$.

Prep. By dissolving white marble or chalk in hydrochloric acid, adding a little chlorinated lime and slaked lime to the solution, filtering, evaporating to dryness at 400° F. (204°·4 C.), and preserving it in well-closed bottles.

Prop. In whitish crystalline semitransparent masses or fragments, with a bitter, acrid, saline taste, deliquescent, and soluble in twice its weight of water, from which it can be crystallised; soluble in alcohol. It evolves no chlorine or hypochlorous acid on the addition of hydrochloric acid. The aqueous solution is not precipitated by the addition of lime water. (Freedom from iron and alumina.)

Off. Prep. **Liquor Calcii Chloridi.** *Solution of Chloride of Calcium.* (Chloride of calcium, eighty-eight grains; distilled water, one fluid ounce.) Filtered if necessary; sp. gr. 1·145.

Therapeutics and Use. It is introduced into the Pharmacopœia on account of the power it possesses of absorbing water, and is employed in the preparation of chloroform, ether, &c.; it is used also in the rectification of spirit and as a test. (*See* Appendix.) As a medicine, chloride of calcium seems to act upon the glandular system, and was formerly used in scrofula; it also appears to possess the power of allaying certain forms of vomiting

Dose. 3 gr. to 10 gr. and upwards; of the liquor, 15 min. to 50 min.

CALX CHLORINATA. Chlorinated Lime. It may be regarded as consisting chiefly of a compound of hypochlorite and chloride of calcium ($CaCl_2O_2, CaCl_2$), or as a direct compound of chlorine and lime ($CaOCl_2$). It always contains some uncombined lime.

Prep. By passing chlorine gas over slaked lime loosely spread out in a proper chamber or vessel until it is completely saturated. ($2Ca(HO)_2 + 2Cl_2 = CaCl_2 + CaCl_2O_2 + 2H_2O$.)

Prop. A whitish powder having the odour of chlorine and an acrid taste; absorbs carbonic acid and water when exposed to the air, and at the same time gives off chlorine; it is only partly soluble in water, the solution being alkaline and possessing bleaching properties; the addition of oxalic acid causes the rapid and copious evolution of chlorine and the deposition of oxalate of calcium. Five grains mixed with 15 grains of iodide of potassium. and dissolved in 4 fluid ounces of water, produce, when acidulated with 1 fluid drachm of hydrochloric acid, a reddish solution requiring for the discharge of its colour at least 467 grain-measures of the volumetric solution of hyposulphite of sodium, which corresponds to 33 per cent. of available chlorine. (For explanation, *see* Appendix, under Volum. Solution of Hyposulphite of Sodium.)

Off. Prep. **Liquor Calcis Chlorinatæ.** *Solution of Chlorinated Lime.* (Chlorinated lime, one pound; distilled water, one gallon.) Sp. gr. 1·055. Eighty grains by weight mixed with twenty grains of iodide of potassium dissolved in four fluid ounces of water, when acidulated with two fluid drachms of hydrochloric acid, give a red solution requiring for the discharge of its colour 450 grain-measures of the volumetric solution of hyposulphite of sodium, equivalent to 2 per cent. of available chlorine.

Vapor Chlori. *Inhalation of Chlorine.* (Chlorinated lime, two ounces; cold water, a sufficiency.) Moisten the powder, and inhale the rising vapour.

Use. In the preparation of chloroform, also as a disinfectant agent to evolve chlorine: it is not often given internally, or used externally, chlorinated sodium being usually substituted for it.

CALCII SULPHAS. Sulphate of Calcium. Native Sulphate of Calcium ($CaSO_4,2H_2O$) rendered nearly anhydrous by heat. Introduced for the preparation of Calx Sulphurata.

CALX SULPHURATA. Sulphurated Lime. A mixture containing not less than 50 per cent. of Sulphide of Calcium (CaS).

Prep. Sulphate of calcium, seven ounces; wood charcoal, one ounce. Mix and heat to redness until the black colour has disappeared.

Prop. A nearly white powder with a smell somewhat resembling that of sulphuretted hydrogen. Very slightly soluble in water, the solution rapidly decomposing with evolution of sulphuretted hydrogen.

Therapeutics. It possesses properties analogous to those of the sulphurous springs of Harrogate, Barèges, &c., sometimes causing eructation of sulphuretted hydrogen, and in large doses acting as an irritant to the stomach. It is used chiefly for its action on boils, carbuncles, scrofulous sores, &c., hastening maturation and checking the formation of pus if employed in the early stages of inflammation.

Dose. $\frac{1}{10}$ gr. to 1 gr.

CALCII PHOSPHAS. Phosphate of Calcium. $Ca_3(PO_4)_2$.

Prep. By dissolving bone ash in hydrochloric acid, precipitating the solution with ammonia, and drying at a temperature not exceeding 212° F. (100° C.).

Prop. A white powder insoluble in water, but soluble without effervescence in dilute nitric acid. The solution continues clear when an excess of acetate of sodium is added to it, but lets fall a white precipitate on the addition of oxalate of ammonium, or perchloride of iron (oxalate of calcium and phosphate of iron being respectively formed. The acetate of sodium is previously added to neutralise the nitric acid, in which oxalate of calcium and phosphate of iron are soluble). Ten grains dissolve without effervescence in dilute hydrochloric acid, and the solution yields with ammonia a white precipitate (phosphate of calcium), insoluble in boiling potash, and when washed and dried weighing 10 grains: the absence of effervescence proves that no carbonate is present, and the weight of the precipitate shows that the salt is pure.

Off. Prep. (Contained in Pulvis Antimonialis.)

Therapeutics. Not much used as a medicinal agent. It has been given in scrofula and in rickets with an idea that it promotes the formation of bone. And the author has evidence of the value of this salt in cases of deficient bone production, both in the lower animals and in man.

Dose. 10 gr. to 20 gr.

CALCII HYPOPHOSPHIS. Hypophosphite of Calcium. $Ca(PH_2O_2)_2$.

Prep. By heating phosphorus with hydrate of calcium and water, until phosphuretted hydrogen ceases to be evolved. $3(CaO,H_2O) + 2P_4 + 6H_2O = 3Ca(PH_2O_2)_2 + 2PH_3$. The liquid is then filtered, and the uncombined lime separated with carbonic acid gas; the remaining solution is evaporated until the salt separates in a crystalline form.

Prop. A white crystalline salt, with a pearly lustre, and a bitter nauseous taste. Soluble in six parts of cold water, and only slightly more soluble in hot water; insoluble in rectified spirit. The crystals do not lose water when heated to 300° F. (148°·9 C.). Heated to redness they ignite, evolving spontaneously inflammable phosphuretted hydrogen, and leaving a reddish-coloured residue amounting to about 80 per cent. of the salt.

Therapeutics. The hypophosphites of calcium and sodium are said to possess all the stimulant, tonic, and alterative virtues of phosphorus, without being open to the objections which may be urged against the use of the uncombined drug (*see* Phosphorus). They were originally introduced as remedies for pulmonary phthisis; careful observations, however, both in this country and in France, appear to have proved their worthlessness in this respect.

Dose. 5 gr. to 10 gr.

CERIUM.

(Ce. Eq. = 141.)

Some of the salts of cerium, a metal which exists in a few rare minerals, as cerite, have been employed in medicine during the last few years, and the oxalate is now made official.

CERII OXALAS. Oxalate of Cerium. $CeC_2O_4,3H_2O$.

A salt which may be obtained as a precipitate by adding a solution of oxalate of ammonium to a soluble salt of cerium.

Prop. A white granular powder, insoluble in water, decomposed at a dull red heat into a reddish-brown powder, which dissolves completely and without effervescence in boiling hydrochloric acid. The resulting solution gives with solution of sulphate of potassium a white crystalline precipitate of double sulphate of cerium and potassium. If the salt be boiled with solution of potash and filtered, the filtrate is not affected by solution of chloride of ammonium, but when supersaturated with acetic acid it gives with chloride of calcium a white precipitate which is soluble in hydrochloric acid. Ten grains lose 5·2 grains in weight by incineration.

Therapeutics. Oxalate of cerium appears to act as a local sedative, and afterwards upon the system as a nervine tonic. It has been employed in irritable states of the stomach, as gastrodynia, vomiting and pyrosis, in the same way as nitrate of silver and subnitrate of bismuth; it is said to be very useful in the vomiting of pregnancy. It is also administered on account of its remote action in chronic forms of nervous disease, as epilepsy and chorea; likewise in convulsive cough and nervous palpitation of the heart. Cerium salts were first used by Sir James Simpson, of Edinburgh, who considered that they possess at least one great advantage over salts of silver in not causing blackening of the skin when long persevered in.

Dose. 1 gr. to 2 gr.

Other cerium preparations, as the *oxide* and *nitrate*, have been used, but as yet the therapeutic action of the salts of cerium is but imperfectly understood.

CUPRUM. COPPER.

(Cu. Eq. = 63·4.)

CUPRUM. Copper. Fine copper wire, about No. 25 wire-gauge, or about 0·02 inch. Copper, in the form of foil, thin and bright, is contained in the Appendix.

Prop. & Use. Metallic copper has a well-known peculiar red colour; sp. gr. 8·86; malleable and ductile; oxidisable in the air, especially when in contact with acids, alkalies, or fatty bodies; it is employed to test the purity of hydrochloric acid; it can also be used for the detection of silver and mercury. Copper is also employed in Reinsch's test for arsenic.

CUPRI SULPHAS. Sulphate of Copper. $CuSO_4,5H_2O$.

Prep. May be obtained by heating sulphuric acid and copper together, dissolving the soluble product in hot water and evaporating till crystals form on cooling, or by dissolving black oxide of copper in hot dilute sulphuric acid, filtering, evaporating, and crystallising.

Prop. In oblique rhombic azure-blue crystals, with a styptic metallic taste; efflorescing slightly in dry air; soluble in water; and reddening litmus. The aqueous solution gives a white precipitate with chloride of barium insoluble in hydrochloric acid, and a maroon-red precipitate with ferrocyanide of potassium; it is also precipitated by ammonia, but re-dissolved in excess of the reagent. A watery solution of the salt, to which twice its volume of the solution of chlorine has been added, when treated with an excess of ammonia, gives a clear sapphire-blue solution (from the formation of the ammonio-chloride), leaving nothing undissolved; this shows the absence of iron.

Therapeutics. Internally, in small doses, sulphate of copper is astringent to the alimentary canal; and after absorption, a tonic to the nervous system. In large doses, it is a quick and powerful emetic. Externally, in powder or in strong solution, it acts as an escharotic; in a more diluted form as a stimulant and astringent. It is given as an astringent in cases of obstinate diarrhœa and dysentery, also as a tonic in chorea and epilepsy; in some cases of narcotic poisoning, as an emetic.

Externally, in the solid form or strong solution, it may be used to excessive granulations or ulcers, or as a weaker solution to diminish excessive secretions from mucous membranes, as in ophthalmia, gleet, &c.

Dose. As an astringent or tonic, $\frac{1}{4}$ gr. to 2 gr.; as an emetic, 5 gr. to 10 gr. Externally, in substance or in solution, from 1 gr. to 10 gr., or more, in 1 fl. oz.

Adulterations. Sulphate of iron in the commercial salt; sometimes sulphate of zinc is fraudulently added: the iron is detected by ammonia not redissolving the oxide; zinc, by first precipitating the copper with sulphuretted hydrogen, then, on the addition of ammonia, some of the above gas being in solution, a whitish sulphuret of zinc is thrown down.

CUPRI NITRAS. Nitrate of Copper. $Cu(NO_3)_2,3H_2O$.

Prep. May be obtained by dissolving copper in dilute nitric acid and evaporating the solution until crystallisation takes place on cooling to a temperature not lower than 70° F. (21°·1 C.)

Prop. Deep blue prismatic crystals, very deliquescent, highly corrosive. With one-third of its weight of water it forms, at a temperature below 70° F. (21°·1 C.) tabular crystals, $Cu(NO_3)_2,6H_2O$. With a very little more water it yields a styptic, caustic corrosive fluid. A diluted aqueous solution is only faintly acid to litmus.

Therapeutics. Nitrate of copper is not employed internally. It is regarded as a valuable caustic, and is said to be of especial service in cases of syphilitic ulcers occurring on the tongue or fauces. Owing to its deliquescent property it can be applied only in the liquid state.

SUBACETATE OF COPPER OF COMMERCE. Appendix. Verdigris; Ærugo. $Cu(C_2H_3O_2)_2,CuO$.

Prep. By exposing copper-plates to the action of the fermenting marc of grapes, or pyroligneous acid, when this salt forms on the surface.

Prop. In powder or masses consisting of very minute crystals, of a bluish-green colour, with a peculiar sour metallic odour, and styptic metallic taste; resolved by water into a soluble acetate and insoluble tris-acetate; when treated with sulphuric acid, it gives off acetic acid fumes; it dissolves in this acid when dilute, and from the solution ammonia precipitates the oxide, but re-dissolves it when in excess.

A solution of acetate of copper is used for detecting the presence of butyric acid in valerianate of zinc. (*See* Zinci Valerianas.)

Therapeutics. Verdigris is occasionally used externally as an escharotic, in powder, or mixed with honey and vinegar, under the name of Linimentum Æruginis; it should be applied with a camel's-hair brush.

Adulteration. It sometimes contains chalk and sulphate of copper, detected by its effervescing with an acid, and by the solution precipitating with ammonia and chloride of barium. Other impurities can be detected by the tests given above.

FERRUM. IRON.

Fe. (Eq. = 56.)

FERRUM. Iron.

Annealed iron wire, about No. 35 wire gauge, and wrought iron nails are used in the Pharmacopœia for the formation of the iodide, the sulphate, and the granulated sulphate: and when thus employed should be non-resilient and free from oxide.

Off. Prep. **Mistura Ferri Aromatica.** *Aromatic Mixture of Iron.* (Red cinchona bark, an ounce, and calumba root, in powder, half an ounce; cloves, a quarter ounce; fine iron wire, half an ounce; compound tincture of cardamoms, three fluid ounces; tincture of orange-peel, half a fluid ounce; and peppermint water, to sixteen ounces.)

Vinum Ferri. *Wine of Iron.* (Fine iron wire, one ounce; sherry, one pint; macerate for thirty days.)

Therapeutics. Action of Iron Salts in general. Iron forms an essential part of the red corpuscles of the blood, as much as six and a half per cent. of the metal being contained in the pure colouring matter or hæmatin. The iron appears to be neither in the state of protoxide nor peroxide, but intimately united with the organic elements of the compound. This portion of the blood is apt, from various causes, to become deficient, and a state of system is then induced designated by the term anæmia; to restore the blood when in such a condition to the healthy standard the preparations of iron are most valuable, and hence they are among the most important medicines in the list of the Materia Medica. All the preparations of iron appear to act as blood restorers or hæmatinics, and there is no good clinical evidence to show that, provided the amount of metal is the same, and the solubility ensured, one class of iron salts is superior to another in respect to their effect in improving the state of the blood.

Iron preparations also produce a distinct and direct influence upon the nervous system, independent of their hæmatinic power, and hence their administration is indicated in debility of this system, as in many cases of chorea, neuralgia, hysteria, epilepsy, &c.

Most of the preparations of iron are astringent, and apt to cause constipation, but some are much more astringent than others, and may be advantageously used in passive forms of hæmorrhage, especially when connected with anæmia; likewise in passive mucous and other discharges; they may also be given as bracing tonics. It is often useful to combine some mild aperient with iron preparations. The persalts are most astringent; the salts which contain iron in combination with a vegetable acid possess little or no such effect, although they may cause the bowels to be confined; the preparations of little astringency are especially adapted for cases in which the hæmatinic property only is required, and when it is desirable not to produce any powerful action upon the stomach.

Iron salts are often given in amenorrhœa as emmenagogues, but it is questionable if they act directly upon the uterus; they certainly do so indirectly by restoring the blood to its normal state, and hence causing the necessity for a catamenial discharge.

It is probable that only a small proportion of the iron introduced into the alimentary canal is absorbed into the blood. The greater part is excreted in the fæces, to which it gives a black colour, owing to the formation of iron sulphide, and a little tannate of the metal. Iron is probably absorbed in the form of a soluble albuminate; it is chiefly excreted by those surfaces which yield an albuminous secretion, such as the mucous membranes. Very little passes into the urine; none into the saliva; it has been found in the milk. It is stated to raise the temperature of the body and to increase the amount of urea excreted by the kidneys. There is reason to believe that the beneficial effect of iron in anæmia is not due solely to its furnishing a necessary chemical constituent of the red corpuscles.

The tongue of patients taking ferruginous preparations is usually somewhat stained, and the teeth are apt to become discoloured.

Dose. Of aromatic mixture of iron, 1 fl. oz. to 2 fl. oz.; of iron wine, from 1 fl. drm. to 2 fl. drm. and upwards. The mixture is said to contain less than a grain of iron in sixteen fluid ounces.

The peculiarities of action of the different preparations of iron will be noticed under each.

FERRUM REDACTUM. Reduced Iron. Metallic iron, with a variable amount of magnetic oxide. Fer réduit.

Prep. Made by reducing freshly prepared ferric hydrate to the metallic state, by heating it in a gun-barrel in a furnace, and passing through it hydrogen gas, previously rendered dry by having passed over sulphuric acid and chloride of calcium.

Prop. & Comp. An impalpable powder, of a greyish-black colour, strongly attracted by the magnet, and exhibiting metallic streaks when rubbed with firm pressure in a mortar; it is soluble in dilute hydrochloric acid, with effervescence from the evolution of hydrogen, and the solution gives a light blue precipitate with the ferrocyanide of potassium; it oxidises when exposed to damp air. Ten grains added to an aqueous solution of 50 grains of iodine and 50 grains of iodide of potassium, and digested with them in a small flask at a gentle heat, leave not more than 5 grains undissolved, and this should be entirely soluble in hydrochloric acid: this test indicates that at least one-half of the powder is metallic iron, as the magnetic oxide is not dissolved by the iodine solution.

Off. Prep. **Trochisci Ferri Redacti.** *Reduced Iron Lozenges.* (Reduced iron, seven hundred and twenty grains; refined sugar, twenty-five; gum acacia, an ounce; mucilage of gum acacia, two fluid ounces; distilled water, an ounce. Mix and divide into 720 lozenges.) Each lozenge contains a grain of reduced iron.

Therapeutics. Reduced iron may be given when we desire the blood-restoring properties of the metal without any astringent action. It is a powerful hæmatinic, even in small doses. It usually sits easily on the stomach; but occasionally annoys by the evolution of sulphuretted hydrogen, causing disagreeable eructations. The author has used it extensively for many years in the treatment of anæmia.

Dose. Of reduced iron, 2 gr. to 6 gr. It may be taken with advantage during a meal, the powder being mixed up with the food; or it can be made into a pill with Balsam of Peru, which prevents the oxidation of the metal. Of the lozenges, 1 to 6.

Adulteration. Reduced iron is very apt to contain some sulphuret, from a subsulphate being thrown down with the oxide. Occasionally magnetic oxide has been mixed with or substituted for the reduced metal. The former impurity can be detected by the evolution of sulphuretted hydrogen when an acid is added; the latter by the want of effervescence or non-evolution of hydrogen, and the quantitative test above given.

FERRI CARBONAS SACCHARATA. Saccharated Carbonate of Iron. Carbonate of Iron, $\mathbf{FeCO_3,xH_2O}$, mixed with peroxide of iron and sugar, the carbonate (if reckoned as anhydrous) forming about one-third of the mixture.

Prep. Made by decomposing a solution of the sulphate of iron, by means of carbonate of ammonium, collecting the precipitated carbonate on a filter, and having first subjected it to expression, rubbing it with sugar in a porcelain mortar, and drying at a temperature not exceeding 212° F. (100° C.).

Prop. In small lumps of a grey-brown colour, and a sweet chalybeate taste, dissolves with effervescence in warm hydrochloric acid diluted with half its volume of water, and this solution is but slightly affected by chloride of barium, showing absence of sulphate.

Thirty grains dissolved in excess of hydrochloric acid and diluted with water continue to give a blue precipitate with the ferricyanide of potassium, until at least 287·5 grain-measures of the volumetric solution of bichromate of potassium have been added.

Off. Prep. **Mistura Ferri Composita.** *Compound Mixture of Iron.* (Sulphate of iron, twenty-five grains; carbonate of potassium, thirty grains; myrrh, and refined sugar, of each, sixty grains; spirit of nutmeg, four fluid drachms; rose water, nine and a half fluid ounces. Rub the myrrh with the spirit of nutmeg and the carbonate of potash; to these, while rubbing, add first the rose-water, with the sugar, then the sulphate; double decomposition occurs with formation of carbonate of iron. Put the mixture immediately into a glass vessel, and preserve from contact with air.

Pilula Ferri Carbonatis. *Pill of Carbonate of Iron.* (Saccharated carbonate of iron, one ounce; confection of roses, a quarter of an ounce.)

Therapeutics. The carbonate of iron in any of the above preparations has the hæmatinic properties of iron before noticed. The carbonate is not astringent, and produces little or no action upon the mucous membranes of the alimentary canal. It has enjoyed great repute in the form of mist. ferri comp., or Griffiths's mixture, as it is called, in the treatment of anæmic amenorrhœa.

Dose. Of saccharated carbonate of iron, 5 gr. to 20 gr. or more; of compound mixture of iron, 1 fl. oz. to 2 fl. oz.; of pill of carbonate of iron, 5 gr. to 20 gr. or more. When the mixture has been kept many days, it becomes reddish-brown in colour, from the green carbonate being converted into the sesquioxide of iron. The sugar in the other two preparations preserves the salt from oxidation.

FERRI IODIDUM. Iodide of Iron, FeI_2. (Not official in the separate form, but occurring in two preparations in the Pharmacopœia).

Off. Prep. **Syrupus Ferri Iodidi.** *Syrup of Iodide of Iron.* (Iodine, two ounces; iron, one ounce; distilled water, thirteen fluid ounces, or as much as may be necessary; sugar, twenty-eight ounces. Mix the iodine and iron with three ounces of water, and heat until the froth becomes white, then filter the liquid while still hot into the syrup which has been previously prepared by dissolving the sugar in ten ounces of water, and mix.) The product should weigh two pounds eleven ounces, and should have sp. gr. 1·385.

It contains 4·3 grains of iodide of iron in one fluid drachm.

Pilula Ferri Iodidi. *Pill of Iodide of Iron.* (Fine iron wire, forty grains; iodine, eighty grains; refined sugar, in powder, seventy grains; liquorice root, in powder, one hundred and forty grains; distilled water, fifty minims. Agitate the iron with the iodine and water in a strong stoppered ounce phial, until the froth becomes white. Pour the fluid upon the sugar in a mortar, triturate briskly, and gradually add the liquorice.) One grain of iodide of iron is contained in about three grains and a half of the pill.

Therapeutics. Iodide of iron possesses the valuable properties of the ferruginous salts, in addition to those of iodine; it is peculiarly applicable to the treatment of the following conditions of the system:—

In scrofulous diseases; in cases in which there is also much anæmia, the depressing influence of the iodine being counterbalanced by the hæmatinic powers of the iron.

In phthisis it has been much lauded, and although it does not act as a specific, yet in many cases it has appeared to produce a beneficial effect. It is often combined in these cases with cod-liver oil.

In some cases of rheumatoid arthritis it has proved useful, especially if the pains in the joints are increased by the heat of bed.

In secondary and tertiary forms of syphilis occurring in cachectic subjects.

It may, in fact, be administered whenever we wish to give iodine, and at the same time desire the tonic and blood-making power of the iron.

It should be remembered that the proportion of iron to iodine is small, only as 1 to 4½.

Dose. Of the syrup, ½ fl. drm. to 1 fl. drm. Of the pill, 3 gr. to 8 gr. or more.

FERRI SULPHAS. Sulphate of Iron. $FeSO_4,7H_2O$.

FERRI SULPHAS EXSICCATA. Dried Sulphate of Iron. $FeSO_4,H_2O$.

FERRI SULPHAS GRANULATA. Granulated Sulphate of Iron. $FeSO_4,7H_2O$.

Prep. Sulphate of Iron is made by dissolving iron wire in sulphuric acid, and crystallising the solution; the *Dried Sulphate of Iron* by exposing these crystals to a temperature of 212° F. (100°C.), until aqueous vapour ceases to be given off; and the *Granulated Sulphate* by pouring the hot solution of sulphate of iron into rectified spirit, and stirring the mixture so that the salt shall separate in minute granular crystals.

Prop. In light bluish-green oblique rhombic prisms having an astringent styptic taste; it dissolves in about 1½ times its weight of cold water; is insoluble in alcohol; it generally contains a little persalt; the solution, when exposed, gradually becomes turbid, depositing a reddish-brown sediment of the peroxide; it gives a white precipitate with chloride of barium, a nearly white one with ferrocyanide of potassium, and a blue one with the ferricyanide. The crystals should be free from opaque rust-coloured spots, and dissolve in water without leaving any ochry residue. The aqueous solution gives no precipitate with sulphuretted hydrogen. *Dried sulphate of iron* forms a whitish powder, containing rather more than 10·5 per cent. of water. The *granulated sulphate* occurs in small granular crystals of a pale greenish-blue colour, and has the composition and properties of the ordinary sulphate, containing about 45 per cent. of water.

Off. Prep. Sulphate of iron is used in the preparation of mist. ferri comp.; but in this preparation the carbonate of iron is formed.

Therapeutics. The same as iron salts in general, but in addition it has a powerful astringent action. It may be employed when an astringent is required with iron, as in passive hæmorrhages and mucous discharges, and is altogether a most valuable remedy in anæmic and relaxed conditions of the habit. The author has largely employed this salt, sometimes in doses as large as 15 grains, and has every reason to be satisfied with its action. It may also be used externally for its constricting powers.

Dose. Of the sulphate or granulated sulphate, 1 gr. to 5 gr., or even 10 gr., in pill or solution recently prepared. Of the dried sulphate from ½ gr. to 3 gr. or more may be administered. As a medicinal agent, the granulated sulphate has no peculiar advantages, except that it is much less liable to become oxidised than the common sulphate.

Incompatibles. None of the soluble iron preparations should be given with vegetable infusions or tinctures containing tannic or gallic acids, as inky compounds are then formed, which, though efficient as medicines, are not agreeable to the eye.

FERRI ARSENIAS. Arseniate of Iron. Arseniate of iron, $\mathbf{Fe_3As_2O_8}$, partially oxidised.

Prep. Sulphate of iron, twenty and three-quarter ounces; arseniate of sodium, dried, fifteen and three-quarter ounces; bicarbonate of sodium, four and a half ounces; boiling distilled water a sufficiency. Made by precipitating a mixed solution of arseniate of sodium and sulphate of iron with a solution of bicarbonate of sodium; collecting and washing the precipitate. It should be dried by squeezing it in folds of linen in a screw-press, and afterwards exposing it on porous bricks in a warm-air chamber, whose temperature should not exceed 100° F. (37°·8 C.). In this way arseniate of iron and sulphate of sodium are formed. The decomposition may be represented thus:—

$$3FeSO_4 + 2Na_2HAsO_4 + 2NaHCO_3 = Fe_3As_2O_8 + 3Na_2SO_4 + 2H_2O + 2CO_2.$$

Prop. A tasteless amorphous powder, of a green colour, insoluble in water, but readily soluble in hydrochloric acid. Its solution gives a blue precipitate both with ferro- and ferricyanide of potassium, more abundant with the latter. A small quantity boiled with an excess of caustic soda and filtered, gives, when exactly neutralised by nitric acid, a brick-red precipitate on the addition of solution of nitrate of silver (arseniate of silver). The solution in hydrochloric acid when diluted gives no precipitate with chloride of barium (absence of sulphate).

100 grains dissolved in excess of sulphuric acid diluted with water, continue to give a blue precipitate with ferrocyanide of potassium, until at least 225 grain-measures of the volumetric solution of bichromate of potassium have been added. (For the explanation of this test, *see* Appendix, Volumetric Solution of Bichromate of Potassium.)

Therapeutics. From a therapeutic point of view, this preparation is identical with arsenious acid. It can exert none of the specific effects of iron in such doses as are borne by the stomach.

Dose. $\frac{1}{16}$ gr. to $\frac{1}{2}$ gr.

FERRI PHOSPHAS. Phosphate of Iron. Ferrous phosphate, $Fe_3(PO_4)_2,8H_2O$, at least 47 per cent., with ferric phosphate and some oxide.

Prep. In the same manner as the arseniate of iron, phosphate of sodium being made use of in the place of arseniate of sodium. (Sulphate of iron, three ounces; phosphate of sodium, two and three-quarter ounces; bicarbonate of sodium, three-quarters of an ounce):

$$3FeSO_4 + 2Na_2HPO_4 + 2NaHCO_3 = Fe_3(PO_4)_2 + 3Na_2SO_4 + 2H_2O + 2CO.$$

Prop. A slate-blue amorphous powder, insoluble in water, soluble in hydrochloric acid; the solution precipitates both with ferrocyanide and ferricyanide of potassium, more abundantly with the latter (showing that both proto- and per-salt are present); when treated with tartaric acid and an excess of ammonia, and subsequently with the solution of ammonio-sulphate of magnesium, it lets fall a crystalline precipitate, indicating phosphoric acid. (For explanation of this test, *see* Appendix, under solution of Ammonio-sulphate of Magnesium.) If digested in hydrochloric acid with pure copper foil, a dark deposit does not form on the metal (absence of arsenic). Thirty grains, dissolved in hydrochloric acid, continue to give a blue precipitate with ferricyanide of potassium until 279 grain-measures of the volumetric solution of bichromate of potassium have been added. (*See* Appendix, Vol. Sol. of Bichromate of Potassium.)

Off. Prep. **Syrupus Ferri Phosphatis.** *Syrup of Phosphate of Iron.* (Prepared by precipitating a solution of two hundred and twenty-four grains of granulated sulphate of iron with a mixture of two hundred grains of phosphate, and fifty-six grains of bicarbonate of sodium; the precipitate is pressed strongly between folds of bibulous paper, and one ounce and a quarter of concentrated phosphoric acid added; as soon as the precipitate is dissolved, the solution is filtered; eight ounces of sugar are then added and dissolved without heat. The product should measure twelve fluid ounces.)

One grain of anhydrous phosphate of iron is contained in each fluid drachm of the syrup.

Therapeutics. The blue phosphate of iron was much used by the late Dr. Prout in the treatment of diabetes. It acts as a blood-restorer like the other preparations of iron, and has been recommended also in the treatment of rickets.

The syrup is an agreeable form for its administration, but it must be remembered that there is an excess of phosphoric acid present.

Dose. 5 gr. to 10 gr. Of the syrup, 1 fl. drm. and upwards.

FERRI PEROXIDUM HYDRATUM. Hydrated Peroxide of Iron. Fe_2O_3,H_2O or $Fe_2O_2(HO)_2$.

Prep. By drying the moist peroxide of iron at a temperature not exceeding 212° F. (100° C.), and reducing it to a powder.

Prop. A reddish-brown powder, insoluble in water, destitute of taste, and not magnetic. It dissolves slowly, with the aid of heat, in hydrochloric acid diluted with half its volume of water, and forms a solution which gives a copious blue precipitate with ferrocyanide of potassium; none with the ferricyanide of potassium. It is often calcined to improve its colour, but this process injures it by diminishing its solubility. Heated to dull redness in a test tube it gives off moisture.

Off. Prep. **Emplastrum Ferri.** *Chalybeate Plaster.* (Hydrated peroxide of iron, in fine powder, one ounce; Burgundy pitch, two ounces; lead plaster, eight ounces.)

Therapeutics. It is a non-irritating preparation of iron, and is useful when it is desirable to continue the use of iron for a long time, or to give it in large doses; it has been much administered in tic douloureux and other neuralgic affections.

As an external application its value as an iron preparation is very questionable.

Dose. 5 gr. to 30 gr., or more, in treacle or honey.

LIQUOR FERRI DIALYSATUS. Solution of Dialysed Iron. The solution so called really consists of highly basic ferric oxychloride, from which most of the acidulous matter has been removed by dialysis.

Prep. (Six ounces of strong solution of perchloride of iron are mixed with two pints of water, and dilute ammonia in slight excess is added, and stirred. The precipitated ferric hydrate is separated by filtration, washed with distilled water, and the superfluous moisture removed by squeezing. The precipitate is then dissolved or nearly so by being warmed with an ounce of strong solution of perchloride of iron, the liquid filtered if necessary, and placed in a covered dialyser, and subjected to a stream of water until the solution on the dialyser is almost tasteless.) The resulting solution should measure twenty-eight fluid ounces.

Prop. A clear dark reddish-brown liquid, free from marked ferruginous taste and from acid reaction. Sp. gr. 1·047. It should give no precipitate with ferrocyanide of potassium or with nitrate of silver, these tests indicating the absence of any trace of perchloride of iron.

Therapeutics. A convenient preparation in cases where the blood restoring properties of iron are desired without any astringent effects.

Dose. 10 min. to 30 min.

LIQUOR FERRI PERCHLORIDI FORTIOR. Strong Solution of Perchloride of Iron.

Prep. By dissolving iron wire in hydrochloric acid, and subsequently peroxidising the iron by evaporating the solution with nitric acid, and afterwards diluting with water to the proper strength.

Prop. An orange-brown solution, with a strong styptic taste; miscible in water and alcohol in all proportions. Diluted with water, it is precipitated white by nitrate of silver, and blue by the ferrocyanide of potassium, but not at all by the ferricyanide. Sp. gr. 1·42. A fluid drachm diluted with water, and precipitated with ammonia, yields a precipitate (peroxide of iron), which when washed and incinerated weighs between 15 and 16 grains. Two ounces of iron are contained in ten fluid ounces of the solution.

Off. Prep. **Liquor Ferri Perchloridi.** *Solution of Perchloride of Iron.* The same strength as Tinctura Ferri Perchloridi. (Strong solution of perchloride of iron, five fluid ounces; distilled water, sufficient to produce after admixture twenty fluid ounces.)

Tinctura Ferri Perchloridi. *Tincture of Perchloride of Iron.* (Strong solution of perchloride of iron, five fluid ounces; rectified spirit, five fluid ounces; distilled water, ten fluid ounces.)

Therapeutics. A most powerful astringent ferruginous preparation, useful in passive hæmorrhages and other discharges; also in erysipelas. Given as a blood-restorer, as well as an astringent.

Dose. Of the tincture 10 min. to 40 min. or more, and the same for the solution.

LIQUOR FERRI PERNITRATIS. Solution of Pernitrate of Iron.

Prep. By dissolving iron wire in nitric acid and diluting to the proper strength. One ounce of iron wire with four and a half fluid ounces of nitric acid are used in preparing thirty ounces of the solution.

Prop. A clear solution of reddish-brown colour, slightly acid and astringent to the taste. It gives a blue precipitate with the ferrocyanide, but not with the ferricyanide of potassium. When to a little of it in a test tube half its volume of pure sulphuric acid is added, and then a solution of sulphate of iron is poured in, the whole assumes a dark-brown colour, showing the presence of nitric acid in the solution. Sp. gr. 1·107. One fluid drachm precipitated with ammonia yields 2·6 grains of peroxide of iron.

Therapeutics. A powerful astringent tonic, and useful in the same cases as the perchloride. It has been much used in Dublin, and is recommended in some forms of diarrhœa in debilitated subjects, and in passive mucous discharges.

Dose. 10 min. to 40 min.

LIQUOR FERRI PERSULPHATIS. Solution of Persulphate of Iron.

Prep. By boiling a solution of protosulphate of iron and sulphuric acid with nitric acid, until all the proto- is converted into a per-sulphate.

Prop. A dense solution of a dark-red colour, inodorous and astringent, miscible with water and alcohol in all proportions. Diluted with ten volumes of water, it gives a white precipitate with chloride of barium and a blue one with ferrocyanide of potassium, but not with the ferricyanide. Sp. gr. 1·441. One fluid drachm yields with ammonia 11·44 grains of peroxide of iron.

Use. It is not given as a remedy, but is employed in the preparation of ferri et ammonii citras, ferri et quininæ citras, ferri peroxidum hydratum, and ferrum tartaratum. It is highly astringent.

FERRI ET AMMONII CITRAS. Citrate of Iron and Ammonium.

Prep. Ferric hydrate, recently precipitated from the solution of the persulphate by means of ammonia, is dissolved in a solution of citric acid by the aid of heat, the liquid neutralised by the addition of ammonia, evaporated to the consistence of syrup, and dried in thin layers on flat porcelain or glass plates at a temperature not exceeding 100° F. (37°·8 C.).

Prop. It is not crystalline, but dries in garnet or hyacinth-red transparent scales. It feebly reddens litmus paper, is soluble in water, but almost insoluble in rectified spirit. Its aqueous solution is of a sweet and very slight styptic taste. When incinerated with exposure to air it leaves about 30 per cent. of peroxide of iron, which is not alkaline. Heated with solution of potash, it evolves ammonia and deposits ferric hydrate; the alkaline solution from which the iron has separated does not, when slightly supersaturated with acetic acid, give any crystalline deposit, showing the absence of tartaric acid. When acidulated with hydrochloric acid it gives a copious precipitate with ferrocyanide of potassium, but none with the ferricyanide.

Off. Prep. **Vinum Ferri Citratis.** *Wine of Citrate of Iron.* (Citrate of iron and ammonia, 160 grains; orange wine, one pint. Dissolve, shake; after three days, filter.)

Therapeutics. As a blood-restorer it is a very effectual salt, and it possesses scarcely any astringency; it may often be given, especially in an effervescent mixture, when the stomach will not bear the more styptic preparations of iron. It is well adapted for administration to children, as the taste is not unpleasant.

Dose. 5 gr. to 10 gr. and upwards. Of the wine, 1 fl. drm. to 4 fl. drm.

Incompatibles. Tannin solutions strike black; caustic alkalies precipitate the oxide.

FERRUM TARTARATUM. Tartarated Iron; Tartrate of Iron and Potassium.

Synonym. Ferri Potassio-Tartras.

Prep. Ferric hydrate recently precipitated from the solution of the persulphate by ammonia, is mixed with a solution of acid tartrate of potassium, and the mixture digested with repeated stirring for twenty-four hours, the temperature being always kept below 140° F. (60° C.). The solution is afterwards allowed to cool, any undissolved precipitate removed, and the fluid (reduced to the consistence of syrup) poured in a thin layer on flat glass or porcelain plates, and evaporated to dryness at a temperature not exceeding 100° F. (37°·8 C.).

Prop. Garnet scales, having the physical characters of the ammonio-citrate, but darker in colour; sparingly soluble in spirit; soluble in water, the solution is neutral; when acidulated with hydrochloric acid, it gives a copious blue precipitate with ferrocyanide of potassium, none with ferricyanide. Boiled with a solution of soda, ferric hydrate separates, but no ammonia is evolved, and the filtered solution, when slightly acidulated by acetic acid, gives as it cools a crystalline deposit (acid tartrate of potassium). Fifty grains incinerated at a red heat, and what is left washed with distilled water and again incinerated, leave a residue of peroxide of iron weighing about 15 grains.

Therapeutics. The action of the tartarated iron is exactly similar to that of the ammonia-citrate; it can be prescribed with the alkaline carbonates. It is probable that this salt, besides possessing hæmatinic powers, acts on the blood and urine in the same way as the simple alkaline tartrates; but in the doses in which it is usually given, these latter effects would be scarcely appreciable.

Dose. Of the salt, 5 gr. to 10 gr.

FERRI ET QUININÆ CITRAS. Citrate of Iron and Quinine.

Prep. Freshly precipitated ferric hydrate (prepared by precipitating a solution of the persulphate of iron by means of ammonia) is dissolved in a solution of citric acid, and to this is added quinine (prepared by dissolving sulphate of quinine by the aid of a little sulphuric acid in water, and precipitating the quinine by ammonia), and the liquid digested on a water bath till the alkaloid is dissolved. It is then evaporated in thin layers on porcelain or glass plates, in the manner directed for the ammonio-citrate.

Prop. In thin lustrous scales of a greenish-yellow colour, deliquescent, entirely soluble in cold water. The solution is slightly acid, and is precipitated reddish-brown by solution of soda, white by solution of ammonia, blue by the ferrocyanide and by the ferricyanide of potassium, and greyish-black by tannic acid.

Taste bitter and chalybeate. When completely burned with exposure to air, it leaves a residue (peroxide of iron) which yields nothing to water. Fifty grains dissolved in a fluid ounce of water, and treated with a slight excess of ammonia, yield a precipitate of quinine, weighing when dried 7½ grains. The precipitate is entirely soluble in ether, and when burned leaves but a minute residue; when dissolved in a dilute acid, and purified with a little animal charcoal, it yields a solution which turns the plane of polarisation strongly to the left. This test determines the amount, nature, and purity of the alkaloid.

Therapeutics. This salt possesses the combined properties of both iron and quinine, and is an elegant preparation: it must be remembered that the quinine is precipitated by alkalies, and therefore it cannot be prescribed with these latter remedies.

Dose. 5 gr. to 10 gr.

Adulterations. Deficiency of quinine, and substitution of cinchonine, &c., indicated by above tests.

LIQUOR FERRI ACETATIS FORTIOR. Strong Solution of Acetate of Iron.

Prep. Ferric hydrate (prepared by precipitating a solution of persulphate of iron by means of ammonia), is dissolved in glacial acetic acid, and diluted with sufficient distilled water to give a solution of sp. gr. 1·127.

Prop. A deep-red fluid with a sour styptic taste, and acetous odour, miscible in all proportions with water or rectified spirit. A fluid drachm, diluted with two ounces of water, gives with excess of ammonia, a reddish-brown precipitate, which when washed and ignited weighs 5·7 grains.

Off. Prep. **Liquor Ferri Acetatis.** *Solution of Acetate of Iron.* (Strong solution of acetate of iron, five fluid ounces; distilled water, sufficient to produce after admixture twenty fluid ounces.) Sp. gr. 1·031.

Tinctura Ferri Acetatis. *Tincture of Acetate of Iron.* (Strong solution of acetate of iron, five fluid ounces; acetic acid, one fluid ounce; rectified spirit, five fluid ounces; distilled water, nine fluid ounces. Mix and then add sufficient distilled water to make one pint.) The same strength as the solution of acetate of iron.

Therapeutics. A very palatable hæmatinic.

Dose. Of the strong solution, 1 min. to 8 min.; of the tincture or of the solution, 5 min. to 30 min.

HYDRARGYRUM. MERCURY.

(Hg. Eq. = 200.)

HYDRARGYRUM Mercury. Quicksilver.

Prep. Mercury is obtained chiefly from its sulphide, native cinnabar, by distillation with iron; sometimes it is met with in its metallic state, sometimes combined with chlorine, &c. Mercury of commerce is purified by redistillation and washing with dilute hydrochloric acid.

Prop. When pure, mercury occurs as a brilliant white metallic liquid entirely vaporised by a heat below that of visible redness; and when small globules of it are rolled slowly upon a sheet of paper, not the least particle adheres. It forms two classes of salts, proto- and persalts. It dissolves many metals, as tin, bismuth, zinc, silver, and gold, and forms amalgams with them.

Off. Prep. Liquid mercury is seldom used in medicine, but there are many preparations which owe their value to the presence of mercury in a very highly divided state, caused by long trituration with saccharine and greasy matters, or fine powders.

Hydrargyrum cum Cretâ. *Mercury with Chalk. Grey Powder.* (Mercury, one ounce; prepared chalk, two ounces. Rub together until globules are no longer visible.)

Prop. A light-grey powder, free from grittiness; insoluble in water; partly dissolved by dilute hydrochloric acid, the mercury being left in a finely-divided state; the solution in hydrochloric acid is not precipitated by the addition of chloride of tin, showing the absence of perchloride of mercury, which would be then precipitated as calomel.

Pilula Hydrargyri. *Mercurial Pill. Blue Pill.* (Mercury, two ounces; confection of roses, three ounces; powdered liquorice root, one ounce. Rub the mercury with the confection until globules can no longer be seen; then, the liquorice being added, beat the whole together to form a mass.)

Emplastrum Hydrargyri. *Mercurial Plaster.* (Mercury, three ounces; olive oil, fifty-six grains; sulphur, eight grains; lead plaster, six ounces. Heat the oil and add the sulphur, with this mixture rub the mercury till globules disappear; then add the lead plaster, previously liquefied.)

Emplastrum Ammoniaci cum Hydrargyro. *Ammoniacum and Mercury Plaster.* (Ammoniacum, twelve ounces; mercury, three ounces; olive oil, fifty-six grains; sulphur, eight grains.)

Unguentum Hydrargyri. *Mercurial Ointment. Blue Ointment.* (Mercury, one pound; prepared lard, one pound; prepared suet, one ounce. Rubbed together thoroughly.)

Unguentum Hydrargyri Compositum. *Compound Mercury Ointment.* (Ointment of mercury, six ounces; yellow wax and olive oil, of each three ounces; camphor, one and a half ounce.)

Linimentum Hydrargyri. *Liniment of Mercury.* (Ointment of mercury, one ounce; solution of ammonia, and liniment of camphor, each one fluid ounce.)

Suppositoria Hydrargyri. *Mercurial Suppositories.* (Ointment of mercury, sixty grains; oil of theobroma, one hundred and twenty grains. Form twelve suppositories.) Each suppository contains five grains of ointment of mercury.

Therapeutics of Mercurials. Liquid mercury, when taken into the stomach, appears to possess no action on the economy, and very large quantities, even pounds, have at times been swallowed without any particular symptoms being produced; now and then, however, the full effects of the metal have ensued, probably owing to partial oxidation and absorption. The vapour of mercury acts with great energy, as seen in the effects on artificers exposed to its influence; the same results may be produced by rubbing mercury in a very highly divided state upon the surface of the body, or taking it internally in a state of minute subdivision. Given in small doses, the first effects of mercurials are observed in the increase of various secretions; and hence sialagogue, cholagogue, diuretic, emmenagogue, and other properties have been ascribed to this mineral. Its sialagogue power is shown in the increase of the salivary fluid and mucous secretions of the mouth, together with a peculiar condition of the gums and neighbouring parts; and as these are among the first, most constant, and most peculiar of the effects of mercurials, they are generally taken as guides during the administration of the drug, as to the propriety of increasing or diminishing the dose. The sialagogue effects are seldom desired for themselves.

The cholagogue effect, at least the power of emptying the gall-bladder of contained bile, is exhibited in the increase of the colouring matter and other principles of the bile in the evacuations from the bowels; the fæces are at the same time more liquid in character from an excessive secretion from other secreting glands, as the pancreas, and also the mucous membrane of the intestinal canal. It has been shown by experiments on animals that mercurials, so far from increasing the amount of the biliary secretion, actually diminish it. The secretion of the kidneys is not unfrequently augmented, also the action of the skin, and occasionally the catamenial discharge; it seems probable, however, that many of these effects are not so much due to the direct action of the remedy on the secreting organs, as to the relief of certain morbid conditions of the system, which had given rise to the imperfect performance of their functions. Mercurials also cause the absorption of morbid fluids, either from increasing the activity of the absorbent system, or preventing deposition. In whatever way mercury is administered it becomes absorbed into the blood, where it has been detected; and its presence has also been demonstrated in the milk, urine, saliva, sweat, bile, pus from ulcers, and in the various tissues of the body, as the bones, brain, serous and synovial membranes, cellular tissue, and lungs. Its action on the blood is not well made out; it diminishes the number of red corpuscles, and has some influence on the quantity and quality of the fibrine. Mercurials are employed in the treatment of various diseases, among which the following are the most important.

In *internal congestions*, as of the liver, kidneys, &c.; to increase secretion, and hence relieve the vessels.

Acute inflammation is often found to give way when the system is brought under the influence of mercury, probably from its power of increasing the secretions of the part, influencing the capillary circulation, and altering the condition of the blood; sthenic inflammations, with effusions of plastic lymph, are more controlled by the drug than those of an asthenic kind; serous membranes are more influenced than mucous membranes, and the parenchyma of the liver more than that of the lungs. In *chronic inflammations* mercurials often prove useful in removing the morbid products, such as fibrinous induration and other effusions.

Mercury is injurious in erythematous and scrofulous inflammation, and also in inflammatory action of a low type.

Of late, some doubt has been thrown upon the power of mercurials to check inflammation; it may be affirmed that when the inflammation abates, the mercurial produces its physiological effects, and that the subsidence of the morbid action is not caused by the influence of the metal.

In acute *rheumatism* mercurials are much employed by some practitioners; it is questionable whether they influence the duration of the disease, but they are generally considered to be useful in the peri- or endo-carditis, which is so frequently present.

In *dropsies* dependent on inflammation of serous membranes and hepatic disease mercurials are useful, but injurious when arising from granular disease of the kidneys.

In idiopathic *fevers* mercurials are often useful in keeping up the action of secreting organs and relieving congestion, but they appear to have no influence on the duration of the fever itself.

In *syphilis* mercurials at one time formed the sole remedy; at the present time they are not considered essential to the cure of the affection, although employed in moderate quantities, both in the primary and secondary forms of the disease: it is probable that the terrible sequelæ of syphilis, formerly so common, were often as much dependent on the drug as on the disease itself.

Mercury is very commonly used as an alterative in chronic affections of almost every part of the system, and as a cholagogue purgative in cases of dyspepsia, &c., where the secretion of the liver is defective.

Externally employed, in the form of ointments, plasters, &c., mercurials produce a topical stimulant effect, causing exalted action of the capillaries; they also become absorbed, and affect the system generally. They are used over indurated and chronically inflamed parts, and sometimes to introduce the mineral into the system by a process of exhibition termed inunction.

Effects of over-doses, or the too great action of Mercurials.

Very profuse ptyalism, swelling of the tongue and salivary glands, and of the whole face, tumefaction and redness of the gums, ulceration of different parts of the mucous membrane of the mouth, loosening of the teeth, and even necrosis of the jaw. Occasionally the flow of saliva and buccal mucus amounts to some pints in the day.

Excessive purging, with very bilious stools.

Profound anæmia and marasmus.

Certain skin affections, as Eczema Mercuriale.

Inflammation of the periosteum and bone of parts not connected with the mouth.

A low, febrile condition (mercurial erethism), accompanied with intense prostration of the vital powers.

Affections of the nervous system, such as neuralgic pains, partial paralysis, tremor mercurialis, and sometimes complete paralysis and death; occasionally epileptiform convulsions and mental failure; these symptoms are usually observed in those who are subject to the action of mercurial vapours.

Circumstances influencing the operation of Mercurials.

The age of the patient has great influence; children are much less affected than adults; still, care should be used in administering mercurials to young subjects, as very injurious results sometimes ensue.

Certain individuals appear to be able to resist completely the action of mercurials, others to be very susceptible of their influence; often such idiosyncrasy cannot be explained, but at times it depends on a diseased condition of the system.

The presence of acute sthenic inflammation gives a resisting power to the action of mercurial preparations, whereas granular disease of the kidney, scrofula, and scorbutus, render the system very sensitive to mercury, and the drug should generally be avoided in such cases.

Therapeutics of Mercury in its unoxidised forms.

The mercurial and chalk powder is one of the mildest forms in which the metal can be given; its influence upon the mucous membrane is slight, and hence it may be used in irritable conditions of the intestinal canal, as in diarrhœa, &c. Blue pill is likewise a comparatively unirritating preparation.

As external applications, the blue and compound ointments produce little local action; hence their use when it is desirable to cause the constitutional effects of mercury through the medium of the skin: the mercurial plaster is used to produce the local effects of the remedy, as also the suppository. The liniment, from its containing ammonia, is more irritating than the ointment.

Dose. Of mercury with chalk, or grey powder, 3 gr. to 8 gr.; of mercurial or blue pill, 3 gr. to 8 gr.

The mercurial ointment, or blue ointment, may be rubbed into a part where the skin is thin, as in the arm-pit or inner side of the thigh, in quantities varying from 30 gr. to 120 gr. The inunction should be continued till absorption has taken place.

Adulteration. Other metals, as lead, tin, zinc, and bismuth, are often found in a state of amalgamation with mercury, or dissolved in it: when such are present, the small globules leave a trail when rolled along a sheet of paper: zinc and tin are soluble in hydrochloric acid, and lead and bismuth would not volatilise, and so could be detected : the process of purification by means of distillation and hydrochloric acid removes these impurities.

HYDRARGYRI SUBCHLORIDUM. Subchloride of Mercury. Calomel. $HgCl$.

Prep. Sulphate of mercury, ten ounces; mercury, seven ounces ; chloride of sodium, dried, five ounces ; boiling distilled water, a sufficiency. The sulphate of mercury and the mercury are rubbed together with a little water until globules are no longer visible ; then the chloride of sodium is well triturated with them, and the whole heated, and the vapour sublimed as a powder. In this process the mercuric sulphate is, by being rubbed with a second equivalent of the metal, reduced to a mercurous sulphate ; and this last, by the action of the common salt, is converted into calomel, sulphate of soda being produced at the same time. The decompositions may be thus represented :

1st part of process, $HgSO_4 + Hg = Hg_2SO_4$.

2nd part of process, $Hg_2SO_4 + 2NaCl = Na_2SO_4 + 2HgCl$.

Prop. A dull-white, heavy powder, without odour or taste ; rendered yellowish by trituration in a mortar ; insoluble in water, spirit, or ether ; sublimes with heat ; it is blackened when treated with potash, from precipitation of mercurous oxide, and the clear supernatant fluid, acidulated with nitric acid, gives a copious white precipitate with nitrate of silver, showing the presence of a chloride. When calomel is boiled or washed in water, this liquid should afterwards give no precipitate with nitrate of silver, lime-water, or sulphuretted hydrogen. Contact with hydrocyanic acid darkens its colour as it liberates some metallic mercury. It is entirely volatilised by a sufficient heat. Warm ether shaken with it in a bottle leaves, on evaporation, no residue.

Off. Prep. **Lotio Hydrargyri Nigra.** *Black Mercurial Lotion.* (Subchloride of mercury, thirty grains ; solution of lime, ten fluid ounces. Mix.)

Pilula Hydrargyri Subchloridi Composita. *Compound Pill of Subchloride of Mercury. Plummer's pill.* (Calomel and sulphurated antimony, each one ounce ; guaiacum resin, in powder, two ounces ; castor oil, one fluid ounce.) One grain of calomel is contained in five grains of the pill mass.

Unguentum Hydrargyri Subchloridi. *Ointment of Subchloride of Mercury.* (Calomel, eighty grains ; benzoated lard, one ounce.) About one grain of calomel is contained in six grains of this ointment.

Therapeutics. Calomel when absorbed acts on the system in the manner noticed under Hydrargyrum. Its peculiarities are that it produces little local irritant action ; as a purgative, it increases the secretion of fluid into the intestines ; and hence forms a useful adjunct in affections of the liver, and obstructions to the portal circulation ; calomel has been largely used in the treatment of cholera. It often produces in children the so-named calomel stools, or green-coloured fæces. The compound pill is employed chiefly as an alterative in chronic skin diseases, in which the antimony and guaiacum aid its operation. There is clinical evidence to show that purgative doses of calomel, repeated three or four times during the first week of enteric fever, may diminish the intensity of the attack. (Wunderlich, Niemeyer.)

The ointment is a clean and valuable local alterative application in some forms of skin disease ; it can also be employed as an inunction. In the black mercurial lotion, the suboxide of mercury formed is the active ingredient.

Dose. Of calomel as a purgative, 2 gr. to 5 gr. ; to affect the system, ½ gr. to 1 gr. or more, frequently repeated. Of the compound pill of subchloride of mercury as an alterative, 5 gr. to 10 gr. Calomel should not be given with alkaline chlorides, as corrosive sublimate is liable to be formed.

Adulteration. Calomel is apt to contain a trace of corrosive sublimate (perchloride of mercury) formed in the process of preparation : this can be detected by the water in which it is boiled, exhibiting reactions with the tests above given. Intentional impurities, as carbonate of lead, sulphate or carbonate of barium, &c., are not volatilised by heat, and the carbonates effervesce with acids.

HYDRARGYRI PERCHLORIDUM. Perchloride of Mercury. Corrosive Sublimate. $\mathbf{HgCl_2}$.

Prep. Sulphate of mercury, twenty ounces; chloride of sodium, dried, sixteen ounces; black oxide of manganese, in fine powder, one ounce. The sulphate and the chloride are reduced to fine powder, and then thoroughly mixed by trituration in a mortar with the oxide of manganese ; the corrosive sublimate is then sublimed by heat. When the sulphate of mercury is heated with the common salt, a double decomposition takes place ; mercuric chloride and sulphate of sodium are produced, as represented in the formula, $\mathbf{HgSO_4 + 2NaCl = Na_2SO_4 + HgCl_2}$. The mercuric sulphate frequently contains some mercurous sulphate which the common salt changes into calomel; to prevent this, a little black oxide of manganese is added, which, with the excess of common salt, generates some free chlorine.

Prop. In heavy white crystalline masses of prismatic crystals, of a styptic and metallic taste; soluble in about 20 parts of cold water; more so in alcohol; and more still in ether: its watery solution is precipitated by alkalies and lime-water of a red or yellowish colour (the oxide); it gives a white precipitate with ammonia, and a curdy white precipitate with nitrate of silver; it precipitates albumen, and forms with it a definite and very sparingly soluble compound. When heated, it sublimes without decomposition, leaving no residue.

Off. Prep. **Liquor Hydrargyri Perchloridi.** *Solution of Perchloride of Mercury.* (Perchloride of mercury and chloride of ammonium, of each ten grains; distilled water, a pint.) The presence of the chloride of ammonium increases the solubility of the mercurial salt in water. Contains half a grain in each fluid ounce.

Lotio Hydrargyri Flava. *Yellow Mercurial Lotion.* (Perchloride of mercury, eighteen grains; solution of lime, ten fluid ounces. Mix.)

Therapeutics. Corrosive sublimate is a very powerful irritant; when taken in large doses it causes burning at the epigastrium, vomiting and purging; applied to the skin, it acts as a corrosive. In very small doses it is useful as an alterative in chronic affections, syphilitic or not, as in scaly skin diseases, periosteal affections, &c.; externally, as a lotion, injection, gargle, or ointment, in chronic skin diseases, ulcerated sore throats, and chronic discharge from mucous membranes. In the yellow mercurial lotion the peroxide of mercury is the active ingredient.

All the ordinary effects of mercury may be produced by the exhibition of this salt.

Dose. $\frac{1}{16}$ gr. to $\frac{1}{8}$ gr. in solution or pill, with crumb of bread; of solution of perchloride of mercury, $\frac{1}{2}$ fl. drm. to 2 fl. drm.

Incompatibles. In solution it precipitates most of the vegetable preparations which contain albumen, tannin, &c. It is also thrown down by alkalies, alkaline sulphurets, iodides, and tartar emetic. An iodide in excess redissolves the precipitate.

HYDRARGYRUM AMMONIATUM. Ammoniated Mercury; Ammonio-Chloride of Mercury; White Precipitate of Mercury. NH_2HgCl.

Prep. Corrosive sublimate, three ounces; solution of ammonia, four ounces; distilled water, three pints. Dissolve the perchloride in the water, aided by heat; to the solution, when it has cooled, add the ammonia, frequently shaking it. Collect the precipitated powder on a filter, and wash with distilled water until the liquid which passes through ceases to give a precipitate when dropped into a solution of nitrate of silver acidulated by nitric acid; lastly, dry it. When ammonia is added to a solution of corrosive sublimate, this compound (in which two atoms of the hydrogen in the ammonium are replaced by their equivalent of mercury), and not the oxide of mercury, is precipitated.

Prop. A white, armorphous, heavy powder, usually in the form of small spiral cones from the wringing of the linen filters; when heated, it sublimes; it is insoluble in water, alcohol, and ether; when digested with caustic potash, it gives off vapours of ammonia, and becomes yellow from the formation of the oxide of mercury; and the resulting fluid, filtered, and acidulated with nitric acid, gives a white precipitate with nitrate of silver, showing the presence of a chloride. Boiled with a solution of chloride of tin, it becomes grey, and affords globules of metallic mercury.

Off. Prep. **Unguentum Hydrargyri Ammoniati.** *Ointment of Ammoniated Mercury.*
Synonym. Unguentum Præcipitati Albi.
(Ammoniated mercury, fifty grains; simple ointment, four hundred and fifty grains.)

Therapeutics. Never used internally; externally, it destroys pediculi, and acts as a stimulant application when used to chronic skin affections in the form of the ointment.

Adulteration. Chalk, carbonate of lead, plaster of Paris, &c.; these do not sublime when heated: the carbonates effervesce with acids.

HYDRARGYRI IODIDUM RUBRUM. Red Iodide of Mercury. Mercuric Iodide. HgI_2.

Prep. Four ounces of corrosive sublimate, and five ounces of iodide of potassium, are dissolved separately in boiling water, and the two solutions mixed; the red iodide is precipitated, and is separated by decantation and filtration, and afterwards washed and dried. Double decomposition occurs, perchloride of mercury nd iodide of potassium becoming chloride of potassium and iodide of mercury ($HgCl_2 + 2KI = HgI_2 + 2KCl$).

Prop. A crystalline powder of fine bright vermilion colour, becoming yellow when heated over a lamp on a sheet of paper; almost insoluble in water, dissolves sparingly in alcohol, but freely in ether or in an aqueous solution of iodide of potassium.

When digested with a solution of soda, it assumes a reddish-brown colour, and the fluid, cleared by filtration and mixed with solution of starch, gives a blue precipitate on being acidulated with nitric acid. Entirely volatilised by a heat under redness.

Off. Prep. **Unguentum Hydrargyri Iodidi Rubri.** *Ointment of Red Iodide of Mercury.* (Red iodide of mercury, in fine powder, sixteen grains; simple ointment, one ounce.) Also employed in the preparation of Liquor Arsenii et Hydrargyri Iodi.

Therapeutics. The red iodide closely resembles corrosive sublimate in its action upon the system. It is chiefly used as an external application in the form of ointment to enlarged glands, and periosteal nodes of a syphilitic nature, also in goître.

Internally it may be administered in the same cases as corrosive sublimate.

Dose. $\frac{1}{32}$ gr. to $\frac{1}{8}$ gr.

HYDRARGYRI OXIDUM FLAVUM. Yellow Oxide of Mercury. HgO.

Prep. Four ounces of perchloride of mercury are dissolved in four pints of distilled water with the aid of heat. Two pints of solution of soda are added, and a yellow precipitate of the oxide is thrown down. The supernatant liquid is removed by decantation, and the precipitate washed on a calico filter with distilled water. Dried on a water bath.

Prop. A yellow powder, insoluble in water, but readily soluble in hydrochloric acid. From this solution a white precipitate of the ammonio-chloride is thrown down by ammonia. The oxide is entirely volatilised when heated to incipient redness, being resolved into oxygen gas and the vapour of mercury. This compound is merely an allotropic modification of the red oxide, from which it differs in entering more readily into combination; thus a cold solution of oxalic acid is without action on the red oxide, while it converts the yellow oxide into an oxalate.

Off. Prep. **Oleatum Hydrargyri.** *Oleate of Mercury.* (Yellow oxide of mercury, one ounce; oleic acid, nine ounces.)

Therapeutics. The oleate of mercury has been recommended as an elegant and cleanly substitute for the various mercurial ointments and liniments. The 5 per cent. solution of the oleate resembles olive oil in appearance; the 20 per cent. preparation forms an opaque yellowish mass, not unlike resin ointment, which melts at the temperature of the body, and forms a transparent varnish when applied to the skin. It is simply spread over the surface with a brush. These preparations are employed as local remedies in chronic inflammation of the joints, skin diseases, &c. Also when it is desired to affect the system in syphilis, in place of the ordinary grey ointment. The yellow oxide is the active ingredient in Lotio Hydrargyri Flava.

HYDRARGYRI OXIDUM RUBRUM. Red Oxide of Mercury. **HgO.**

Synonym. Hydrargyri Nitrico-Oxidum.

Prep. Mercury, by weight, eight ounces; nitric acid, four and a half fluid ounces; distilled water, two fluid ounces. Dissolve half the mercury in the nitric acid diluted with the water, evaporate the solution to dryness, and triturate the dry salt thus obtained with the remainder of the mercury. Heat the mixture in a porcelain capsule until acid vapour ceases to arise.

Prop. An orange-red powder, consisting of small crystalline scales, insoluble in water, but entirely soluble in hydrochloric acid. Entirely volatilised by heat under redness, being at the same time decomposed into mercury and oxygen. If this be done in a test tube no orange vapours should be given off, indicating the absence of nitric acid. The solution in hydrochloric acid gives a yellow precipitate with caustic potash in excess, and a white precipitate with solution of ammonia, as do all solutions of corrosive sublimate.

Off. Prep. **Unguentum Hydrargyri Oxidi Rubri.** *Ointment of Red Oxide of Mercury.* (Red oxide of mercury, in very fine powder, sixty-two grains; hard paraffin, a quarter of an ounce; soft paraffin, three quarters of an ounce.)

Therapeutics. Used externally only, as a powerful irritant and escharotic; applied, much diluted, as an ointment to the eye in ophthalmia, to indolent ulcers, &c.; as an escharotic, in powder, alone or mixed with sugar, to specks in the cornea, over excrescences, chancres, and fungous ulcers.

Adulteration. Brick-dust, red-lead, and other red powders, detected by not being volatile; some undecomposed nitrate of mercury may be present, and then red fumes are given off when heated; the nitrate is also soluble in water.

LIQUOR HYDRARGYRI NITRATIS ACIDUS. Acid Solution of Nitrate of Mercury.

Prep. Mercury, four ounces; nitric acid, five fluid ounces; distilled water, one and a half fluid ounces. Mix the nitric acid and the water, and dissolve the mercury in the mixture without heat; afterwards boil gently for fifteen minutes, cool and preserve in a stoppered bottle away from the light.

Prop. A colourless, strongly acid solution, which gives a yellow precipitate with potash added in excess (oxide of mercury). If a crystal of sulphate of iron be dropped into it, in a little time the salt of iron and the liquid in its vicinity acquire a dark colour, showing the presence of nitric acid. Sp. gr. about 2·0. A little of it dropped into hydrochloric acid when diluted with twice its volume of water, gives no precipitate.

Off. Prep. **Unguentum Hydrargyri Nitratis.** *Ointment of Nitrate of Mercury.*

Synonym. Unguentum Citrinum.
(Mercury, by weight, four ounces; nitric acid, twelve fluid ounces; prepared lard, fifteen ounces; olive oil, thirty-two fluid ounces. Dissolve the mercury in the nitric acid with the aid of a gentle heat, then add the solution to the lard and oil, previously melted together by a steam or water bath, and mix thoroughly. If the mixture do not froth up, increase the heat till this occurs.)

Unguentum Hydrargyri Nitratis Dilutum. *Diluted Ointment of Nitrate of Mercury.* (Nitrate of mercury ointment, one ounce; soft paraffin, two ounces.)

Therapeutics. The acid solution of nitrate of mercury is a powerful caustic, and has been applied topically in some cancerous affections and in lupus. The ointment acts as a stimulant, and is used in skin affections, and especially in chronic inflammatory diseases of the eyes, as in ophthalmia tarsi, &c. The ointment can be diluted to any degree.

The acid solution is not intended for internal administration.

HYDRARGYRI SULPHURETUM. (Not official.) Sulphide of Mercury; Artificial Cinnabar, Hydrargyri Bisulphuretum. HgS.

Prep. Mix mercury and sulphur in equivalent proportions, melt them over a fire, and as soon as the mass swells remove the vessel and strongly cover it lest the mixture take fire; then rub the mass to powder and sublime it. When melted sulphur is brought in contact with mercury, direct union ensues, the compound is afterwards sublimed, and forms artificial cinnabar.

Prop. Dark scarlet shining crystalline masses, forming, when powdered, a beautiful scarlet colour, known by the name of vermilion ; insoluble in water or alcohol. Volatilises entirely when heated alone, but with potash it is reduced to metallic globules.

Therapeutics. When the fumes are brought into contact with the surface of the body, the drug acts as a topical alterative and becomes absorbed, affecting the system the same as other mercurials ; probably, when heated in the air, it is decomposed, at least in part. It is used as a fumigation in some syphilitic skin diseases, as ecthyma ; also as an inhalation in venereal sore throat. Rarely or never used internally.

Dose. As a fumigating agent, 30 gr., heated on an iron plate, and placed under the patient wrapped in a blanket ; or the vapours may be applied to the mouth and throat through a funnel.

Adulteration. Red-lead, red oxide of iron, and brick-dust, detected by not subliming ; occasionally red sulphide of arsenic has been found, but this can be detected by heating with charcoal, when it gives off the garlic odour ; also by the other tests for arsenic.

HYDRARGYRI PERSULPHAS. PERSULPHATE OF MERCURY. $HgSO_4$.

Prep. By dissolving twenty ounces, by weight, of mercury, in twelve fluid ounces of sulphuric acid with the aid of heat ; and subsequently evaporating until a dry white salt remains.

Prop. A white crystalline powder, which is decomposed by the action of water, and rendered yellow from the formation of an insoluble basic salt of mercury ($HgSO_4,2HgO$). Entirely volatilised by heat.

Use. It is used in the preparation of corrosive sublimate and calomel, and not given as a remedy. The yellow subsulphate above mentioned, under the name of Turbith Mineral, has been employed as an errhine.

LITHIUM.

(L. Eq. = 7.)

Lithium, the metallic base of lithia, does not exist native, but can be obtained from various minerals, as lepidolite, triphylline, &c., and derives its name from λίθος, a stone, as it was supposed to exist only in the mineral kingdom. It is the lightest solid body known, floats on water and on naphtha, and has a density of 0·5936, and a very small atomic or equivalent weight, only seven on the hydrogen scale. Its oxide (L_2O), which is a powerful base, forms crystallisable salts with the acids. The urate of lithium is much more soluble than that of potassium or sodium, requiring only 220 parts of distilled water at 100° F. (37°·8 C.) to dissolve it.

The salts of lithium were introduced as internal medicinal agents by the author in 1859.

LITHII CARBONAS. Carbonate of Lithium. L_2CO_3.

Prop. In white powder or in minute crystalline grains. It has an alkaline reaction, and is soluble in 150 parts of cold water; its solubility is increased by the presence of carbonic acid in the liquid; not soluble in alcohol. When treated with hydrochloric acid it dissolves with effervescence; the solution when evaporated to dryness leaves a residue of chloride of lithium which communicates a red colour to the flame of a spirit lamp, and redissolved in water yields a precipitate with phosphate of sodium, on the addition of ammonia (the double phosphate of lithium and sodium).

Ten grains neutralised with sulphuric acid, and afterwards heated to redness, should leave 14·86 grains of dry sulphate of lithium; this when redissolved in distilled water yields no precipitate with oxalate of ammonium or solution of lime, showing the absence of calcium or magnesium.

Off. Prep. **Liquor Lithiæ Effervescens.** *Effervescing Solution of Lithia. Lithia Water.* (Carbonate of Lithium, ten grains; water, a pint.) Dissolve and add as much carbonic acid as it will contain under a pressure of four atmospheres.

Therapeutics. From the small amount of lithium sufficient to form a salt with uric acid, and the much greater solubility of the salt, it follows that unless other circumstances interfere with their administration, the lithium salts must be valuable remedies when it is desirable to keep uric acid in solution during its transit through the urinary organs, or prevent its deposition in the structures of the body. The carbonate of lithium acts as a powerful diuretic, and in the same dose has more influence in rendering the urine alkaline than the corresponding salt of sodium or potassium. Accordingly, it may be given with great advantage:

1. In acute and chronic gout, to promote the elimination of urate of sodium from the blood and tissues.

2. In uric acid gravel and renal calculus, owing partly to its solvent, partly to its diuretic, properties. A patient of the author's, a gentleman 60 years of age, was in the habit of passing small uric acid calculi almost daily. He had been operated on for stone. From the time that he began to take carbonate of lithium (5 gr. twice a day), he enjoyed perfect immunity from this symptom,—an immunity which lasted during his lifetime.

Externally, the carbonate of lithium may be employed in the form of a lotion (4 gr. to the ounce). It may be applied on a thin slice of sponge, covered with gutta-percha tissue to prevent evaporation. This lotion may be advantageously used:

1. To parts affected with gouty inflammation, whether acute or chronic.
2. To joints stiffened by chronic gout.
3. To gouty ulcers from which urate of sodium is being discharged. These ulcers are commonly very obstinate; their healing is facilitated and promoted by the lithia lotion.
3. To chalk-stones covered with unbroken skin. Its efficacy in causing their gradual disappearance is unquestionable, though it is not easily explained. The lithium salt is probably absorbed through the skin and thus brought into contact with the deposit; the latter is rendered soluble and passes into the circulation.

The author has known a few instances in which the long continued use of the drug has appeared to cause symptoms referable to the nervous system, as shaking or trembling of one hand, which has disappeared on the omission of the remedy. These cases have been very few. As a diuretic, lithium is much more powerful than either potassium or sodium.

Dose. Of the carbonate, 3 gr. to 6 gr. The carbonate may be given in the form of Liq. Lithiæ effervesc.; dose, 5 oz. to 10 oz.; free dilution aids its diuretic action.

LITHII CITRAS. Citrate of Lithium. $L_3C_6H_5O_7,4H_2O$.

Prep. Made by dissolving fifty grains of carbonate of lithium in one fluid ounce of water containing ninety grains of citric acid, by the aid of heat, evaporating the solution till water ceases to escape, and the residue is converted into a viscid liquid. This is dried at a temperature of about 240° F. (115°·5 C.), pulverised and kept in a stoppered bottle.

Prop. A white crystalline salt, soluble in water without any residue ; the citric acid is carbonised by heating the salt to redness, and the residue, neutralised with hydrochloric acid, and dissolved in alcohol, burns with a crimson flame. Twenty grains burned at a low red heat with free access of air leave 7·8 grains of white residue (carbonate of lithium).

Therapeutics. The citrate of lithium resembles the carbonate, as far as its remote antacid powers are concerned, but it has no direct antacid property ; that is, it has no influence upon any acid it meets with in the alimentary canal. In its action, therefore, it has the same relation to the carbonate as the citrate of potassium has to the carbonate of that base.

Dose. 5 gr. to 10 gr.

MAGNESIUM.

(Mg. Eq.=24.)

Magnesium, the metallic base of the magnesian salt, does not exist native ; when obtained artificially, it is a brilliant grey-coloured metal ; sp. gr. 1·7 ; not readily oxidised except when heated in air, when it forms the earth magnesia.

MAGNESIA PONDEROSA. Heavy Magnesia. Oxide of Magnesium. MgO.

MAGNESIA LEVIS. Light Magnesia. Light Calcined Magnesia. MgO.

Prep. Carbonate of magnesium, four ounces, burnt in a Cornish or Hessian crucible closed loosely by a lid, and exposed to a low red heat, as long as a little of the powder taken from the centre, when cooled and dropped into dilute sulphuric acid, gives rise to effervescence. In preparing the light magnesia, the light carbonate is used. In this process the carbonate is converted into the oxide by the heat driving off the carbonic acid.

The light magnesia differs from magnesia only in its greater levity, the volumes corresponding to the same weight being in the ratio of three and a half to one.

Prop. A white powder with scarcely any taste ; almost insoluble in water, but when moistened giving a slight alkaline reaction to turmeric paper, turning it brown. It dissolves in hydrochloric acid without effervescence ; and the solution when neutralised by a mixed solution of ammonia and chloride of ammonium, gives a copious crystalline deposit when phosphate of sodium is added (the ammonio-magnesian phosphate). Dissolved in nitric acid and neutralised with a mixture of ammonia and chloride of ammonium, it does not give any precipitate with oxalate of ammonium or chloride of barium, showing the absence of any sulphate of calcium, carbonate of magnesium or calcium.

Off. Prep. Light oxide of magnesium is contained in **Pulvis Rhei Compositus** (2 parts in 3).

Therapeutics. Magnesia, when introduced into the stomach, acts first as a direct antacid, neutralising any acid it meets with ; and, as its equivalent is small, its antacid properties are considerable ; if the acid in the stomach is insufficient to neutralise and dissolve the whole of the magnesia, it passes undissolved into the intestines, and if given incautiously, or taken for a long time, it is rather apt to cause concretions in these organs, as the insoluble salts of this metal have a tendency to form a species of cement. The salts of magnesium have all of them a cathartic tendency, and in large doses they produce considerable purgative effects. Magnesia, after its absorption into the blood, renders the urine alkaline, and holds in solution uric acid and urates, and thus often causes the urine to remain clear.

Magnesia is given as an antacid in acidity of the stomach and heartburn, and when there is an acid condition of the intestines ; it is useful on this account in the treatment of the early stages of diarrhœa, especially when combined with rhubarb. Magnesia is especially indicated in acidity with a tendency to constipation, as also in the treatment of the disorders of the alimentary canal in children. Magnesia is at times employed as a lithontriptic from its power of dissolving uric acid ; it is also much used in the treatment of gouty affections, in which it acts both as a direct and remote antacid, and likewise as a purgative. Urate of magnesium is soluble in 1600 parts of water at 100° F. (37°·8 C.).

Dose. Of magnesia or light magnesia : as an antacid, 10 gr. to 20 gr. ; as a purgative or adjunct, 20 gr. to 60 gr.

Adulteration. It is apt to contain a little sulphate, as the carbonate is prepared from the sulphate ; also calcium, the sulphate being usually obtained from dolomite, a magnesian limestone ; lastly, some carbonate, from imperfect calcination ; these can be all detected by the above tests.

MAGNESII CARBONAS PONDEROSA. Heavy Carbonate of Magnesium. $(MgCO_3)_3$, $Mg(HO_2)$, $4H_2O$.

MAGNESII CARBONAS LEVIS. Light Carbonate of Magnesium. $(MgCO_3)_3$, $Mg(HO)_2$, $4H_2O$.

Prep. of Carbonate of Magnesium. Sulphate of magnesium, ten ounces; carbonate of sodium, twelve ounces; boiling distilled water a sufficiency. Dissolve the carbonate and sulphate separately, each in a pint of water ; then mix the solutions, and evaporate the whole to perfect dryness, by means of a sand bath ; digest the residue for half an hour with two pints of water, collect the insoluble matter on a calico filter, and wash till the washings cease to give a precipitate with chloride of barium ; then dry at a temperature not exceeding 212° F. (100° C.).

The *light carbonate of magnesium* is prepared by dissolving the same quantities of the sulphate and carbonate in half a gallon of water each, mixing the two solutions cold, and boiling the mixture in a porcelain dish for fifteen minutes, then transferring to a calico filter, and washing and drying at a heat not exceeding 212° F. (100° C.).

In these processes double decomposition takes place, sulphate of magnesium and carbonate of sodium being converted into sulphate of sodium and carbonate of magnesium, which latter, during the ebullition, is partly decomposed, some carbonic acid being driven off and some oxide left. The difference in the aggregation of the particles in the two carbonates depends on the heat employed in their preparation, and on the amount of dilution of the solutions.

Prop. The heavy carbonate is a white powder with scarcely any taste. The light carbonate under the microscope is found to be partly amorphous, with numerous slender prisms intermixed ; insoluble in water ; neutral, or very slightly alkaline in reaction ; soluble with effervescence in dilute mineral acids, yielding solutions which, when first treated with chloride of ammonium, are not disturbed by the addition of an excess of solution of ammonia, but yield a copious crystalline precipitate upon the addition of phosphate of sodium. With excess of hydrochloric acid it forms a clear solution in which chloride of barium causes no precipitate.

Another portion of the solution supersaturated with ammonia gives no precipitate with oxalic acid, or sulphuretted hydrogen, indicating the absence of sulphates, and of lime, &c. Fifty grains calcined at a red heat are reduced to twenty-two.

Off. Prep. **Liquor Magnesii Carbonatis.** *Solution of Carbonate of Magnesium. Fluid Magnesia.* (Sulphate of magnesium, two ounces; carbonate of sodium, two and a half ounces; water, a sufficiency. Prepare as above, suspend in water and pass pure carbonic acid gas through it, and keep it under pressure for twenty-four hours, with an excess of the gas, filter and again pass carbonic acid through the filtrate.) This solution contains about ten grains of carbonate of magnesium in a fluid ounce, or about two per cent.; if exposed to the air, crystals of the salt are deposited.

Prop. It may effervesce slightly when the containing vessel is first opened. The liquid is clear and not bitter in taste. One fluid ounce, evaporated to dryness, yields a white residue, which after being calcined, weighs about 4 grains (magnesia).

Therapeutics. Carbonate of magnesium acts in the same manner as magnesia, both as an antacid and purgative; the only difference being that when it meets with acidity in the alimentary canal, it gives rise to the evolution of carbonic acid gas, which sometimes is grateful to the stomach, but at other times is troublesome from the uncomfortable distension it causes.

Carbonate of magnesium may be administered with the sulphate; if the salts are so mixed, after a time a solid mass is produced, rendering the combination pharmaceutically incompatible. The solution of the carbonate is an elegant mode of exhibiting the salt, and is not distasteful.

Dose. 10 gr. to 20 gr. as an antacid; 20 gr. to 60 gr. as a purgative. Of solution of carbonate of magnesium, 1 fl. oz. to 2 fl. oz.

Adulteration. Lime and some sulphate may be present, as in the last preparation, detected by the above tests.

LIQUOR MAGNESII CITRATIS. Solution of Citrate of Magnesium. *Limonade Purgative of French writers.*

Prep. Two hundred grains of citric acid and one hundred grains of carbonate of magnesium are dissolved in two ounces of water. The solution is filtered into half-pint bottle, and half a fluid ounce of syrup of lemons added, with enough water to nearly fill the bottle. Forty grains of bicarbonate of potassium in crystals are then introduced, and the bottle immediately corked and wired. The bicarbonate is then dissolved by shaking.

Therapeutics. A mild and agreeable aperient drink.

Dose. 5 fl. oz. to 10 fl. oz.

MAGNESII SULPHAS. Sulphate of Magnesium; Epsom Salts. $MgSO_4,7H_2O$.

Prep. Generally made, at the present time, from dolomite, a magnesian limestone (consisting of the carbonates of calcium and magnesium), by treating it with sulphuric acid, which dissolves out the magnesium, and leaves the calcium in the form of an insoluble sulphate of calcium. Formerly it was prepared from bittern, the residual liquor from the crystallisation of common salt from sea water.

Prop. In 4 or 6-sided colourless prisms, with from 2 to 6 terminal planes; as generally sold it is in small acicular crystals; they should not deliquesce in the air, but have a tendency to effloresce. Sulphate of magnesium is soluble in water, and the solution gives copious white precipitates with chloride of barium (sulphate of barium), and with a mixed solution of ammonia, chloride of ammonium, and phosphate of sodium (ammonio-magnesian phosphate). Its aqueous solution at ordinary temperatures is not precipitated by oxalate of ammonium, showing that no calcium is present. Nor should it give a brown precipitate with chlorinated lime or soda, showing the absence of iron, an occasional impurity. The presence of the proper amount of sulphate of magnesium is shown by the following test:—the precipitate given by carbonate of sodium, when obtained from a boiling solution of 100 grains of the salt, should, when washed, dried, and heated to redness, weigh 16·26 grains.

Off. Prep. **Enema Magnesii Sulphatis.** *Enema of Sulphate of Magnesium.*

Synonym. Enema Catharticum.

(Sulphate of magnesium, one ounce; olive oil, one fluid ounce; mucilage of starch, fifteen fluid ounces.)

Sulphate of magnesium is contained in mistura sennæ composita.

Therapeutics. In ordinary doses sulphate of magnesium acts as a saline purgative, causing a free secretion of watery fluid from the canal. In small doses, and freely diluted, if the purgative effect is not produced, it causes diuresis. Epsom salts are em ployed very frequently, either alone or in combination with other purgatives, and are especially adapted to the treatment of febrile affections, and also where the portal system is congested; with the infusion of senna, sulphate of magnesium forms the ordinary black draught. The enema is used as a purgative. Sulphate of magnesium is seldom administered to produce diuresis. When given alone, in many patients it causes uncomfortable distension of the abdomen, and much rumbling from irregular intestinal contraction.

Dose. In the form of enema an ounce or more may be employed. As a purgative, 120 gr. to ½ oz. or more; in combination, from 60 gr. upwards; as a diuretic, 20 gr. to 60 gr.

Adulteration. When made from bittern it contains chloride of magnesium and sodium; it then deliquesces, and gives off hydrochloric acid fumes with sulphuric acid; it also precipitates nitrate of silver.

MANGANESIUM. MANGANESE.

(Mn. Eq. = 55.)

MANGANESII OXIDUM NIGRUM. Black Oxide of Manganese. **MnO_2.**

Prop. Oxide of manganese, called also black oxide of manganese, is found native, sometimes crystallised, sometimes amorphous; as met with in commerce, it is a black heavy powder, devoid of odour and taste, which dissolves in hydrochloric acid with the evolution of chlorine; and when heated to redness evolves oxygen. Used for producing chlorine and permanganate of potassium.

Therapeutics. Manganese salts injected into the blood or subcutaneously, paralyse voluntary movements and reflex action, and stop the heart in diastole. They have been occasionally employed in medicine: the sulphate of the protoxide, in large doses, as from sixty grains to one hundred and twenty grains, produces purgative effects, and by some is considered to increase the excretion of bile: in small doses this salt, as well as the carbonate, have been given with the idea of improving the condition of the blood, in cases of anæmia; its value, however, has not yet been satisfactorily established, and in every case of anæmia in which the author has employed manganese salts alone, the metal has failed to prove curative; whereas the subsequent administration of iron salts has also been followed by rapid improvement and cure. The black oxide is not used in medicine.

PLUMBUM. LEAD.

(Pb. Eq. = 207.)

Metallic lead is not employed in medicine; but when individuals are exposed for a long time to its influence, as by handling it, they exhibit symptoms of slow poisoning.

PLUMBI OXIDUM. Oxide of Lead. Litharge. PbO.

Prep. It is usually made during the cupellation of lead ores containing silver, when the oxide becomes fused or semi-vitrified.

Prop. Heavy pale brick-red scales; entirely soluble in dilute nitric or acetic acid without effervescence; either solution when neutral gives a copious yellow precipitate of iodide of lead with iodide of potassium. Its solution in diluted nitric acid when supersaturated with ammonia and then cleared by filtration does not exhibit a blue colour, indicating the absence of copper. The solution is precipitated black by sulphuretted hydrogen, white by caustic potash, and redissolved by it in excess.

Off. Prep. **Emplastrum Plumbi.** *Lead Plaster.* (Oxide of lead, in fine powder, five pounds; olive oil, ten pounds; water, five pounds. Boil them together over a steam bath for four or five hours, constantly stirring, until the oil and oxide of lead unite into the consistence of a plaster; a little boiling water may be added, if that which was used at the first has evaporated before the end of boiling.)

Therapeutics. Oxide of lead, or litharge, is never given internally. The plaster, in which the lead exists in combination with margaric and oleic acids, is used as a mechanical support; it is less irritating than many other plasters, and perhaps slightly astringent. It occurs in many official plasters.

PLUMBI IODIDUM. Iodide of Lead. PbI_2.

Prep. Made by precipitating a clear solution of nitrate of lead by means of iodide of potassium, and subsequent washing and drying. In this process iodide of lead and nitrate of potassium are formed by double decomposition.

Prop. A yellow powder, or crystalline scales, soluble in boiling water, forming a colourless solution, depositing crystals on cooling. Fuses and sublimes yellow, but soon gives off violet vapours from decomposition. It is altered a little by light.

Off. Prep. **Emplastrum Plumbi Iodidi.** *Iodide of Lead Plaster.* Iodide of lead, two ounces; lead plaster, one pound; resin, two ounces; the resin and plaster are melted at as low a temperature as possible, and the iodide of lead is mixed with them.)

Unguentum Plumbi Iodidi. *Ointment of Iodide of Lead.* (Iodide of lead, in fine powder, sixty-two grains; simple ointment, one ounce; mix thoroughly.)

Therapeutics. Externally applied, iodide of lead acts as a mild stimulant, and has been used in the form of ointment or plaster to enlarged scrofulous joints, &c. The objection to its long-continued use over a large surface is the fear of absorption of the metal; also the yellow stain which it produces if applied to exposed parts of the body, as the neck, &c. (See Iodide of Cadmium.)

PLUMBI ACETAS. Acetate of Lead; Sugar of Lead. $Pb(C_2H_3O_2)_2,3H_2O$.

Prep. By dissolving oxide of lead in dilute acetic acid, and subsequent evaporation and crystallisation.

Prop. Generally in white spongy-looking masses, composed of interlaced acicular crystals; it may be obtained in large, flat four-sided prisms; acetate of lead has a sweetish, acetous odour, and sweet, metallic taste; effloresces slightly in the air; is soluble in water; the solution slightly reddens litmus; and is precipitated white by carbonate of sodium, yellow by iodide of potassium, and black by sulphuretted hydrogen; treated with sulphuric acid, acetic vapours are given off, and white sulphate of lead is precipitated. The solution in distilled water is clear, or has only a slight muddiness, which disappears on the addition of acetic acid; 38 grains dissolved in water require for complete precipitation 200 measures of the volumetric solution of oxalic acid, corresponding to 22·3 grains of oxide of lead.

Off. Prep. **Pilula Plumbi cum Opio.** *Pill of Lead and Opium.* (Acetate of lead, in fine powder, thirty-six grains; opium, in powder, six grains; confection of roses, six grains.) One grain of opium is contained in eight grains of the pill mass.

Suppositoria Plumbi Composita. *Compound Lead Suppositories.* (Acetate of lead, thirty-six grains; opium, in powder, twelve grains; oil of theobroma, one hundred and thirty-two grains. Divide into twelve suppositories.) Each suppository contains three grains of acetate of lead and one grain of opium.

Unguentum Plumbi Acetatis. *Ointment of Acetate of Lead.* (Acetate of lead, in fine powder, twelve grains; benzoated lard, one ounce; mix thoroughly.)

Therapeutics. Acetate of lead in small doses acts as a sedative and astringent, lessening morbid mucous discharges and hæmorrhages, and even diminishing the natural secretions; hence it produces constipation, thirst, and a species of colic named Painters' or lead colic, accompanied with a peculiar blue line on the gums (a valuable diagnostic sign), and occasionally with dark blotches on the mucous lining of the lower lip; when continued for some time, it renders the pulse smaller, and induces wasting of the body; it also produces an influence on the nervous system, shown by the production of neuralgic pains in the limbs and subsequently the loss of power of the extensors of the hand, sometimes complete paralysis, muscular tremor and atrophy, epilepsy, or mental failure. Acetate of lead and other Saturnine preparations cause a diminution of the red corpuscles of the blood, and hence induce an anæmic condition of the body. The production of lead colic is probably due to a loss of power in some portion of the muscular coat of the small intestines.

Lead when taken for a long time also causes the blood to be impregnated with uric acid, and hence leads to the production of a gouty diathesis; this is seen in the prevalence of gout among painters and plumbers.

The serious symptoms above described are, for the most part, brought on by contact with lead in various occupations, and by drinking water impregnated with the metal, and not often by its employment as a medicine.

Acetate of lead is used in hæmorrhages from various organs, also in chronic diarrhœa and dysentery; in phthisis to check expectoration and excessive sweating. Externally it is sedative and astringent, and is sometimes used in skin affections and over inflamed parts. It is also employed as a local astringent in the form of the compound lead suppository and the ointment.

Dose. $\frac{1}{2}$ gr. to 3 gr., or more; of pill of lead and opium, 4 gr. to 8 gr.

LIQUOR PLUMBI SUBACETATIS. Solution of Subacetate of Lead, $Pb_2O(C_2H_3O_2)_2$, in water.

Prep. (Acetate of lead, five ounces; oxide of lead, in powder, three ounces and a half; distilled water, one pint, or a sufficiency. Boil them together for half an hour, frequently stirring, then filter; and when the liquor is cold, add distilled water until the product measures twenty fluid ounces. Let it be kept in well-closed vessels.) By the action of the litharge on acetate of lead, a sub-salt is formed, an additional amount of the oxide of lead entering into the composition of the salt.

Prop. A clear colourless liquid, sp. gr. 1·275, with an alkaline reaction, and sweet, astringent taste, becoming turbid when exposed to the air, from the formation of carbonate of lead; it agrees with the acetate in most of its properties, except that it precipitates gum as well as mucilage from solution, forming an opaque white jelly. Sulphuric acid in excess gives a white precipitate of sulphate of lead, acetic acid being set free. 284·5 gr. by weight require for perfect precipitation 500 grain-measures of the volumetric solution of oxalic acid, corresponding to 24 per cent. of the subacetate of lead, $\mathbf{Pb_2O\ (C_2H_3O_2)_2}$. Solution of subacetate of lead is sometimes termed Goulard Extract.

Off. Prep. **Glycerinum Plumbi Subacetatis.** *Glycerine of Subacetate of Lead.* (Acetate of lead, five ounces; oxide of lead, in powder, three ounces and a half; glycerine, one pint; distilled water, twelve fluid ounces. Mix and boil for a quarter of an hour; then filter and evaporate until the water is dissipated.)

Liquor Plumbi Subacetatis Dilutus. *Diluted Solution of Subacetate of Lead.* (Solution of subacetate of lead, and rectified spirit, each two fluid drachms; distilled water, nineteen fluid ounces and a half.) This preparation is commonly known as Goulard Water.

Unguentum Glycerini Plumbi Subacetatis. *Ointment of Glycerine of Subacetate of Lead.* (Glycerine of subacetate of lead, four ounces and a half; soft paraffin, eighteen ounces; hard paraffin, six ounces.)

Therapeutics. Subacetate of lead acts as an astringent and sedative; it is only used externally; and in the form of the dilute solution, is most commonly employed when the topical action of lead is desired. The ointment and the glycerine are used for a similar purpose.

PLUMBI CARBONAS. Carbonate of Lead. Probably $\mathbf{PbCO_3, Pb(HO)_2}$.

Prep. Often made by exposing sheets of metallic lead to the fumes of acetic and carbonic acids, from vinegar and spent tan.

Prop. & Comp. A heavy white powder insoluble in water, blackened by sulphuretted hydrogen. It is soluble with effervescence in dilute acetic acid, forming a solution which is precipitated yellow by iodide of potassium, and white by sulphuric acid; the solution treated with sulphuretted hydrogen in excess boiled and filtered, gives no precipitate with oxalate of ammonium, showing the absence of calcium salts.

Off. Prep. **Unguentum Plumbi Carbonatis.** *Ointment of Carbonate of Lead.* (Carbonate of lead, in powder, sixty-two grains; simple ointment, one ounce.)

Therapeutics. This salt is not used as an internal remedy; when applied externally, it acts as a local astringent and sedative, and may be used in the same cases as the subacetate. It may be employed either alone or mixed with starch, and powdered upon diseased surfaces; or it may be applied in the form of the ointment.

PLUMBI NITRAS. Nitrate of Lead. $Pb(NO_3)_2$.

Prep. By dissolving lead in boiling nitric acid, slightly diluted, and crystallising out.

Prop. Colourless octahedra, nearly opaque, of a sweetish astringent taste; soluble in water and alcohol, not efflorescent. The aqueous solution is precipitated black by sulphuretted hydrogen, white by dilute sulphuric acid, and yellow by iodide of potassium. Added to a solution of sulphate of indigo, it discharges the colour of that compound.

Use. It is employed in the preparation of the iodide of lead.

Therapeutics. Applied in the form of powder, it is said to be of great value in the treatment of onychia maligna.

POTASSIUM.

(K. Eq. = 39.)

This metal, called also Kalium, does not exist native, but can be obtained from potassium salts; when pure, it has a metallic lead colour; sp. gr. 0·86; rapidly oxidises and is converted into the oxide of potassium, which is contained in the following preparations.

Preliminary remarks. Potassium salts are necessary constituents of the body in health, especially of the muscular tissue and the red blood-corpuscles. Their continued excretion in the urine necessitates a corresponding supply in the food to make good the loss.

Experiments on animals have shown that the potassium salts, when introduced immediately into the blood, are extremely poisonous. The effect seems to be due to the base, and to be independent of the acid with which it is combined (always excepting such compounds as *e.g.*, the cyanides, whose specific action is that of the corresponding acid). In cold-blooded animals, the salts of potassium, even in small doses, cause gradual but complete paralysis of the voluntary muscles, and finally of the heart, which ceases to beat in diastole, and no longer responds to irritation. In warm-blooded animals, the arrest of the heart is preceded by dyspnœa and convulsions. It is still uncertain whether the paralysis be due to some action of the salt on the nervous system, or on the idio-muscular contractility. Small doses raise the blood-pressure in the systemic arteries and slow the heart; lethal ones cause immediate paralysis of the heart and a sudden fall of blood-pressure.

The therapeutic action of the salts of potassium as alkalies, diuretics, purgatives, &c., will be described under the head of the individual compounds.

LIQUOR POTASSÆ. Solution of Potash. **KHO**, in water.

Prep. Carbonate of potassium, one pound; slaked lime, twelve ounces; distilled water, a gallon. Dissolve the carbonate in the water, and having heated the solution to the boiling point in a clean iron vessel, gradually mix it with the slaked lime, and continue the ebullition for ten minutes with constant stirring. Then set by, that the carbonate of calcium may subside. Lastly, when the supernatant liquor has become perfectly clear, transfer it by means of a syphon to a well-stoppered green-glass vessel. In this process he calcium, on account of its affinity for carbonic acid, abstracts tt from the carbonate of potassium, and thus carbonate of calcium, which is insoluble, is precipitated, and potash remains in solution. $CaO + H_2O + K_2CO_3 = CaCO_3 + 2KHO$.

Prop. A colourless liquid, with intensely acrid and caustic taste; sp. gr. 1·058. One fluid ounce requires for neutralisation 482 grain-measures of the volumetric solution of oxalic acid, equivalent to 5·84 per cent. by weight of hydrate of potassium (**KHO**). It does not effervesce when added to an excess of hydrochloric acid, nor give a precipitate with lime or oxalate of ammonium, showing the absence of carbonic acid and calcium; and after being heated with nitric acid in excess, and evaporated to dryness, the residue forms with water a nearly clear solution, which is only slightly precipitated by chloride of barium and nitrate of silver, and is rendered very slightly turbid by ammonia, showing that mere traces of sulphates, chlorides, metallic impurities, or alumina are present; it forms with perchloride of platinum, the yellow double salt ($2\mathbf{KCl},\mathbf{PtCl}_4$). It injures glass containing lead by partially dissolving it; hence it is ordered to be kept in green-glass bottles. One fluid ounce contains 27 grains of hydrate of potassium.

Therapeutics. Liquor potassæ, in large doses and undiluted, is a violent caustic poison; taken into the stomach in a very diluted form it acts at first as a direct antacid, neutralising any free acid in the stomach; but it must be remembered that the amount of alkali contained in a medicinal dose of the solution of potash is small, and hence its antacid powers are necessarily limited. Solution of potash also acts as a powerful sedative upon the mucous membrane of the stomach. After absorption into the blood, free potash possesses the power of increasing the change of tissues in the body, and hence is an alterative, especially to the glandular system, and gives activity to the secreting and excreting organs: it, doubtless, renders the blood more alkaline, and the fibrin less plastic; but from the small amount which can be taken on account of its caustic property, it never produces alkalinity in urine which was previously strongly acid. Solution of potash is used as an antacid in dyspepsia, but in the inflammatory forms of this affection its value depends more upon its sedative than its antacid powers; it is also employed in skin affections, and is especially useful when these depend upon a morbid condition of the stomach, as erythema and certain other cutaneous diseases. As a blood alterant, liquor potassæ has been employed in inflammation of serous membranes, attended with fibrinous depositions, as pleuritis and pericarditis; also in periostitis and cystitis; also to diminish the viscidity of secretions, as in chronic bronchitis, and sometimes in scrofula, syphilis, and chronic rheumatism. As a diuretic, solution of potash is at times employed, and apparently with good effect in some cases. Recently, iodide of potassium has replaced this medicine in a great measure as an alterative.

Externally, when freely diluted, liquor potassæ may be employed as a wash in some chronic skin disorders to remove thickened secretions, and act as a sedative.

Dose. 15 min. to 1 fl. drm., freely diluted.

Adulteration. Carbonate and sulphate of potassium, chloride of potassium, and calcium, all of which can be detected by the tests given above.

POTASSA CAUSTICA. Caustic Potash. **KHO**, not quite pure.

Synonym. Potassæ Hydras. Potassa.

Prep. Two pints of the solution of potash are evaporated in a silver or clean iron vessel over a fire, until, the ebullition being finished, the hydrate of potassium liquefies : this is poured into proper moulds, and when it has solidified, and while it is still warm, put into stoppered bottles.

Prop. Caustic potash is usually moulded for medical purposes into small sticks about the size of a pencil, which should be white, but are often greenish, bluish, or reddish-brown from impurities ; it quickly deliquesces when exposed to air, and, if pure, dissolves in rectified spirit ; it dissolves animal tissues, forming a kind of soap with them ; a watery solution acidulated by nitric acid, gives a yellow precipitate with perchloride of platinum, and scanty white precipitates with nitrate of silver and chloride of barium. 56 grains dissolved in water leave only a trace of sediment, and require for neutralisation at least 900 grain-measures of the volumetric solution of oxalic acid, corresponding to 42·3 grains of potash.

Therapeutics. The hydrate of potassium, and also its mixture with equal parts of lime (potassa cum calce), which is not now official, are used only externally, as caustics, for the formation of sloughs, for touching ulcers, &c. ; the advantage of the latter depends on its being much less deliquescent : it is applied as a paste made with spirit ; it is often cast in cylinders for external use.

Adulteration. The same as of liquor potassæ ; besides which, oxides of iron and alumina are often present ; these are not soluble in spirit.

POTASSII CARBONAS. Carbonate of Potassium. K_2CO_3, with about 16 per cent. of water of crystallisation.

Prep. From pearl-ashes (made from the ashes of wood) by solution in a small amount of water and crystallisation ; in which process most of the other salts contained in the wood are left undissolved. By heating the crystallised bicarbonate to redness, a very pure dry carbonate of potassium is obtained.

Prop. In small white and rather opaque crystalline grains, having a strong alkaline taste ; it deliquesces in the air ; soluble in water, insoluble in spirit ; effervesces with dilute hydrochloric acid, and forms a solution with which perchloride of platinum gives a yellow precipitate ; when supersaturated with nitric acid and evaporated to dryness, the residue is almost entirely soluble in water, only a little silica remaining undissolved, and the solution is precipitated only faintly by chloride of barium or nitrate of silver. 83 grains require for neutralisation at least 980 grain-measures of the volumetric solution of oxalic acid. It should be kept in a well-stoppered bottle. 20 grains of this salt neutralise 17 grains of citric or 18 grains of tartaric acid.

Therapeutics. Almost the same as of potash, but is much less caustic, and hence more of the alkali can be introduced into the system ; after absorption its effects are the same. Sometimes it is employed externally as a wash.

Carbonate of potassium is contained in the compound decoction of aloes and compound iron mixture ; also used as a solvent in the arsenical solution. It has been a popular remedy for whooping-cough.

Dose. 10 gr. to 30 gr.

Adulteration. Sulphates and chlorides are very apt to be present ; detected by the tests above given.

POTASSII BICARBONAS. Bicarbonate of Potassium. $KHCO_3$.

Prep. Made by saturating a strong aqueous solution of carbonate of potassium with carbonic acid gas, and recrystallising the separated salt.

Prop. In large transparent colourless rhombic prisms, not deliquescent, with a mild alkaline taste ; soluble in about four times its weight of water. The solution, when cold, does not precipitate sulphate of magnesium ; effervesces with nitric acid ; and the supersaturated solution is not precipitated by chloride of barium, and scarcely by nitrate of silver. With dilute hydrochloric acid it forms a solution with which perchloride of platinum gives a yellow precipitate ($2KCl,PtCl_4$). Fifty grains exposed to a low red heat leave 34½ grains of a white residue, which require for exact saturation 500 grain-measures of the volumetric solution of oxalic acid. 20 grains neutralise 14 grains of citric or 15 grains of tartaric acid.

Therapeutics. Bicarbonate of potassium acts as a direct antacid, but does not produce the sedative effect of liquor potassæ upon the mucous membrane of the stomach ; it may be taken in very large doses, and is readily absorbed. It renders the urine, and probably many other secretions, strongly alkaline, and doubtless influences the composition of the blood; hence it is a powerful alterative; the action of the kidneys is likewise often increased by its administration. It is used in dyspepsia as an antacid; also in urinary affections where there is excessive deposit of uric acid. Bicarbonate of potassium may be also employed with great advantage in the treatment of inflammatory affections, as acute rheumatism, &c.

Off. Prep. **Liquor Potassæ Effervescens.** *Effervescing Solution of Potash. Potash Water.* (Bicarbonate of potassium, thirty grains; water, a pint; pass into this as much carbonic acid as can be introduced under a pressure of four atmospheres.)

Dose. 10 gr. to 30 gr. as an antacid, &c.; in acute rheumatism, 30 gr. to 60 gr. every 4 hours, freely diluted with water.

Adulteration. It is apt to contain carbonate of potassium, which can be detected by its precipitating sulphate of magnesium.

POTASSII ACETAS. Acetate of Potassium. $KC_2H_3O_2$.

Prep. Acetic acid, forty ounces, or a sufficiency; carbonate of potassium, twenty ounces. To the acetic acid, placed in a thin porcelain basin, add gradually the carbonate of potassium; then strain; if necessary add a few additional drops of acetic acid; evaporate the liquor until the salt is dried; then raise the heat cautiously so as to liquefy the product. Allow the basin to cool; and when the salt has solidified, and while it is still warm, break it in fragments and put into stoppered bottles. Simply a substitution of acetic for carbonic acid, which comes off with effervescence.

Prop. White foliated satiny masses, this appearance being caused by the crystallisation after fusion; neutral in reaction, and deliquescent; very soluble in water, also in alcohol. The solution of acetate of potassium in water should not be precipitated by chloride of barium or nitrate of silver; or if the silver salt does precipitate it, this is again dissolved by water or dilute nitric acid. With a watery solution of the salt, tartaric acid causes a crystalline precipitate (acid tartrate of potassium), and a dilute solution of perchloride of iron strikes a blood-red colour. The solution is unaffected by sulphydrate of ammonium.

Therapeutics. When taken internally in moderate doses and freely diluted it becomes absorbed, and the acetic acid being destroyed or burnt off in the blood, appears in the urine as a carbonate, rendering that fluid alkaline ; it has been shown, contrary to expectation, that the acetate of potassium, administered to a healthy man, causes only a slight increase of the urinary water, and actually diminishes the amount of urea and solids excreted in the twenty-four hours, possibly by interfering with digestion ; in large doses and concentrated, it sometimes produces a slight purgative action.

It is used chiefly as a diuretic in various forms of dropsy, and it is perhaps the most powerful saline diuretic that we possess; it is also now and then employed on account of its alkaline alterative effects upon the blood and secretions, as in acute rheumatism, skin diseases, and chronic enlargement of the glands and other organs. Sometimes it is used as an anti-lithic, on account of its power of rendering the urine capable of holding uric acid in solution.

Dose. 10 gr. to 40 gr. as a diuretic ; as a purgative, 120 gr., upwards.

Adulteration. It may contain traces of sulphates and chlorides, detected by the above tests. Acetate of silver is rather insoluble, and hence may be precipitated if the solution is very concentrated.

POTASSII CITRAS. Citrate of Potassium. $K_3C_6H_5O_7$.

Prep. By neutralising carbonate of potassium with citric acid, when carbonic acid gas is liberated, and citrate of potassium formed.

Prop. A white deliquescent crystalline powder, very soluble in water, feebly acid in taste. Heated with sulphuric acid, it forms a brown fluid, gives off an inflammable gas, and evolves the odour of acetic acid. Its solution, mixed with a solution of chloride of calcium, remains clear till it is boiled, when a white precipitate separates (citrate of calcium), readily soluble in acetic acid. Its solution acidulated with hydrochloric acid gives a yellow precipitate with perchloride of platinum. 102 grains heated to redness till gases cease to be evolved, leave an alkaline residue (carbonate of potassium) which requires for exact saturation 1000 grain-measures of the volumetric solution of oxalic acid.

Therapeutics. Citrate of potassium is more pleasant to the taste, more readily absorbed into the system, and less liable to purge than the other vegetable salts of potassium. Its diuretic action in health resembles that of the acetate ; it slightly increases the urinary water, and diminishes the total amount of solids. It is a valuable saline febrifuge, increasing the secretion from the kidneys in disease. The citrate is readily decomposed after absorption into the blood, reduced to a state of carbonate of the base, and in this state is eliminated in the urine, rendering this fluid less acid or even alkaline in reaction. It is thus an indirect alkaline remedy, although in the stomach it possesses no antacid properties. It may be used with advantage in cases of uric acid gravel and allied diseases, and probably might be also usefully given as an alterative in some of the chronic diseases for which the acetate has been prescribed. Citrate of potassium possesses powerful anti-scorbutic properties.

Dose. 20 gr. to 60 gr.

POTASSII TARTRAS. Tartrate of Potassium. $K_2C_4H_4O_6$, H_2O.

Prep. Boil the acid tartrate with carbonate of potassium, when an equivalent of hydrogen in the acid salt is replaced by one of potassium, and carbonic acid is given off; concentrate and crystallise.

Prop. Small granular crystals, usually without distinguishable shape; its real form is a right rhombic prism; neutral, deliquescent, and very soluble in water. Acetic acid added sparingly to its solution causes the separation of a white crystalline precipitate, the acid tartrate and acetate of potassium being thus formed. Heated with sulphuric acid it forms a black tarry fluid, evolving inflammable gas, and the odour of burned sugar. It is entirely dissolved by its own weight of water. 122 grains heated to redness, till gases cease to be evolved, leave an alkaline residue, which requires for exact saturation 990 grain-measures of the volumetric solution of oxalic acid.

Therapeutics. In small doses it acts as a diuretic, and is changed into the carbonate in the same way as the acetate; in larger doses it is purgative, producing watery evacuations. This salt is seldom employed except as a saline cathartic, and is added to vegetable purgatives, as senna and rhubarb, to increase their action. Its tendency to cause intestinal action militates against its use as a diuretic.

Dose. As a purgative, 60 gr. to ½ oz.

Adulteration. Some sulphates may be present, which may be detected by the tests already given for them.

POTASSII TARTRAS ACIDA. Acid Tartrate of Potassium. **$KHC_4H_4O_6$.**

Synonym. Potassæ Bitartras. Cream of Tartar.

Prep. From the crude tartar, argol, which occurs on the inside of wine casks, by purification with charcoal and clay. It is called cream of tartar from the purest crystals being skimmed off the saturated solution while evaporating.

Prop. A gritty, white powder; or in fragments of cakes crystallised on one surface; or in small oblique rhombic prisms; acid, slightly soluble in water; insoluble in spirit. Heated in a crucible, it evolves inflammable gas and the odour of burned sugar, and leaves a black residue (carbonate of potassium and carbon), which effervesces with dilute hydrochloric acid, and forms a solution which, when filtered, gives a yellow precipitate with perchloride of platinum, and when neutralised by ammonia is rendered slightly turbid by oxalic acid: 204 grains heated to redness till gas ceases to be evolved, leave an alkaline residue, which requires for exact saturation 1000 grain-measures of the volumetric solution of oxalic acid.

Off. Prep. Contained in pulv. jalapæ comp., and confectio sulphuris.

Therapeutics. In small doses acid tartrate of potassium is refrigerant and diuretic; in larger doses it acts as a powerful hydragogue purgative, without producing much depression. It is employed to form an acid drink in febrile and dropsical affections, and as a purgative in dropsies, depending upon renal or cardiac disease. It is desirable when a full purgative effect is wished for, to combine the salt with some vegetable purgative, as jalap, gamboge, or scammony, for the purpose of increasing peristaltic action, and causing the evacuation of the fluid. The author has known the salt, when given alone in large doses, cause a large flow of fluid into the intestine, followed by subsequent absorption, from the bowel not being sufficiently stimulated to evacuate it.

Dose. As a refrigerant or diuretic, 20 gr. to 60 gr.; as a hydragogue purgative, 120 gr. to 300 gr.

Adulteration. Often contains a little tartrate of calcium.

POTASSII SULPHAS. Sulphate of Potassium. **K_2SO_4.**

Prep. From acid sulphate of potassium (**$KHSO_4$**) formed in the preparation of nitric acid from sulphuric acid and nitre. The acid sulphate is dissolved in water, and treated with slaked lime until the solution is slightly alkaline. Excess of lime is removed by the addition of carbonate of potassium, and the fluid is then rendered neutral or slightly acid by diluted sulphuric acid. The sulphate of potassium is allowed to crystallise out after evaporation.

Prop. In hard, semi-transparent, colourless, six-sided prisms, terminated by corresponding pyramids; decrepitates when heated; of a bitter saline taste, slightly soluble in water, and insoluble in alcohol. The aqueous solution is neutral, gives no precipitate with oxalate of ammonium, but acidulated with hydrochloric acid, is precipitated yellow by perchloride of platinum, and white by chloride of barium.

Off. Prep. It is contained in pulv. ipecacuanhæ compositus; pilula colocynthidis composita; pilula colocynthidis et hyoscyami.

Therapeutics. Mildly purgative. It is almost always given in combination with rhubarb or some other vegetable aperient; by some it is supposed to be alterative, acting on the secreting and excreting organs; latterly, evidence has been given of its acting as a poison in large doses. It was at one time supposed to have the power of repressing the secretion of milk. It is often used on account of its mechanical properties for the purpose of more intimately dividing vegetable substances, as in the compound ipecacuanha powder.

Dose. 15 gr. to 120 gr. as a purgative; in smaller doses as an alterative.

POTASSII NITRAS. Nitrate of potassium. Nitre. **KNO_3.**

Prep. Certain soils in India contain nitrates of calcium and potassium; these, by being treated with wood ashes (carbonate of potassium), yield nitrate of potassium and carbonate of calcium; the former is dissolved out and crystallised, and purified by re-solution and crystallisation.

Prop. In white crystalline masses or fragments of six-sided prisms, transparent, striated, with a peculiar cooling taste, soluble in water, not precipitated by chloride of barium or nitrate of silver; deflagrates with heated charcoal, and forms carbonate of potassium; warmed in a test tube with sulphuric acid and copper filings, it evolves ruddy fumes (peroxide of nitrogen). The solution acidulated with hydrochloric acid, gives a yellow precipitate with perchloride of platinum.

Off. Prep. **Argenti et Potassii Nitras.** *Nitrate of Silver and Potassium. Mitigated Caustic.* (Nitrate of silver, one ounce; nitrate of potassium, two ounces.)

Therapeutics. Nitre is refrigerant and diuretic, and in large doses exerts a powerful sedative action upon the heart and vascular system. It was once thought to cause some peculiar change in the blood by imparting oxygen to that fluid, but this idea has been shown to be fallacious. It is used in small doses as a refrigerant and diuretic in febrile affections, and to allay irritation of the mucous membrane of the stomach in inflammatory forms of dyspepsia; in large doses as a vascular sedative in febrile affections, and especially in acute rheumatism. In certain forms of dropsy, its action on the kidneys sometimes proves useful.

Dose. 10 gr. to 20 gr. as a refrigerant and diuretic; 20 gr. to 30 gr. as a vascular sedative.

Adulteration. It may contain traces of sulphate or chloride: detected by chloride of barium and nitrate of silver: calcium, if present, would yield a precipitate with oxalate of ammonium.

POTASSII CHLORAS. Chlorate of Potassium. $KClO_3$.

Prep. By passing a stream of chlorine gas through a mixture of carbonate of potassium and slaked lime; when saturation has taken place, chlorate of potassium, chloride of calcium, and carbonate of calcium are formed; after the carbonate has been removed by filtration, the less sparingly soluble chlorate crystallises on evaporating the solution.

$$(K_2CO_3 + 6CaH_2O_2 + 6Cl_2 = 2KClO_3 + 5CaCl_2 + CaCO_3 + 6H_2O.)$$

Prop. In colourless transparent tabular crystals with four or six sides; have a cooling taste; soluble in sixteen parts of cold water: when a few drops of sulphuric acid are dropped upon the crystals, they become orange-red, and give off yellow vapours of peroxide of chlorine; when the salt is rubbed with sulphur in a mortar, it detonates. When heated, it first liquefies and then gives off nearly 39 per cent. of oxygen, and leaves a white residue, chloride of potassium (KCl), readily forming with water a neutral solution, which is precipitated white by nitrate of silver, and yellow by perchloride of platinum. The solution of the chlorate is not affected by nitrate of silver or oxalate of ammonium.

Off. Prep. **Trochisci Potassii Chloratis.** *Chlorate of Potassium*

Lozenges. (Chlorate of potassium, 3600 grains; refined sugar, twenty-five ounces; gum acacia, an ounce; all in powder; mucilage of gum acacia, two fluid ounces; distilled water, a fluid ounce. Mix, and divide into 720 lozenges. 5 gr. of chlorate of potassium contained in each lozenge.)

Therapeutics. Chlorate of potassium acts as a refrigerant and diuretic, in a manner similar to nitre; it has been supposed to give oxygen to the system, but this is evidently an error, for it is found to pass through the kidneys in the oxidised state and not as chloride of potassium. It appears to exert a powerful action upon the mucous membranes with which it comes in contact, and has been found extremely useful as a gargle in cases of severe tonsillitis, stomatitis, cancrum oris, and mercurial ptyalism; it has also been employed in low fevers, as scarlatina maligna, typhus and typhoid fevers, but its efficacy is less marked as a general than as a local remedy.

Dose. 10 gr. to 20 gr. or more.

Adulteration. Chloride of potassium may be present.

POTASSII PERMANGANAS. Permanganate of Potassium, $KMnO_4$.

Prep. Mix three and a half ounces of chlorate of potassium with four ounces of peroxide of manganese, and add a solution of five ounces of caustic potash in a small quantity of water. Evaporate the whole to dryness, pulverise the residue and expose it to a dull red heat till all the chlorate is decomposed, by which means manganate of potassium and chloride of potassium are formed (probably $3MnO_2 + 6KHO + KClO_3 = 3K_2MnO_4 + KCl + 3H_2O$). Pulverise the cooled residue and boil with water. Saturate with carbonic acid, evaporate and crystallise. The manganate is decomposed into the permanganate, peroxide of manganese, and potash (probably $3K_2MnO_4 + 2H_2O = 2KMnO_4 + MnO_2 + 4KHO$). The peroxide thus formed is allowed to subside, and the solution containing the permanganate of potassium, decanted, again boiled and redecanted. The solution is evaporated till a pellicle forms, then allowed to crystallise, and the crystals are finally dried by placing them under a bell-jar over a vessel containing sulphuric acid.

Prop. Dark purple acicular crystals, sometimes reflecting a metallic green colour, and having a sweet astringent taste. A single small crystal is sufficient to colour an ounce of water deep purple, which when mixed with a little rectified spirit and heated, is changed to a yellowish brown; this is due to the deoxidation of the acid by the organic matter and its reduction to the state of peroxide of manganese. The crystals evolve oxygen gas when heated, and leave a black residue in which the presence of potash may be detected by the usual tests. Five grains dissolved in water, require for complete decoloration a solution of 44 grains of granulated sulphate of iron, acidulated with 2 fluid drachms of dilute sulphuric acid. In this decomposition, the ferrous sulphate absorbs oxygen from the permanganate, and becomes converted into a persalt with the aid of the additional sulphuric acid present.

Off. Prep. **Liquor Potassii Permanganatis.** *Solution of Permanganate of Potassium.* (Permanganate of potassium, eighty-eight grains; distilled water, one pint.) Condy's fluid contains 4 grains of the salt to the fluid ounce.

Therapeutics. Permanganate of potassium is a powerful oxidising agent, and possesses the power of destroying many organic substances; hence it acts as an antiseptic and deodoriser. If taken internally, it is probable that it is changed in the stomach into peroxide of manganese, giving off oxygen to the organic substances contained in that organ.

Permanganate of potassium is valuable as an application to foul ulcers, gangrenous parts, &c.; it is also useful in some cases as an injection or gargle in some affections of the mucous membranes, as of the mouth, throat, and vagina; in mercurial salivation, &c.

Of its value as an internal remedy we know little: it was once stated to be useful in diabetes, but observations by the author, given in the Gulstonian Lectures, 1857, before the Royal College of Physicians, showed that it had no effect in decreasing the saccharine elimination, sometimes even increasing it, when irritation of the stomach was produced. Other physicians have subsequently arrived at the same results. It is probable that its remote effects are the same as those of black oxide of manganese, which are very unimportant.

Dose. 1 gr. to 5 gr. if given internally. Externally, 1 fl. drm. of the solution to 5 or 10 oz. of water. Internally, 2 fl. drm. to 4 fl. drm. of the solution.

POTASSII IODIDUM. Iodide of Potassium. KI.

Prep. The mode of preparing this salt consists in adding iodine to a solution of potash, when the following changes ensue ($6KHO + I_6 = 5KI + KIO_3 + 3H_2O$). The mixture of the two salts, namely, the iodide of potassium and iodate of potassium with a little charcoal in fine powder, is heated to redness, by which means the iodate of potassium is converted into iodide of potassium, the charcoal facilitating the deoxidation.

Prop. In white semi-transparent cubic crystals; without odour if pure, and of a saline taste; as met with in commerce, it occasionally has some odour of free iodine; very soluble in water, and in about six or eight parts of rectified spirit; the solutions should be neutral; and the watery solution, mixed with mucilage of starch, gives a blue colour on the addition of a minute quantity of chlorine. It gives a crystalline precipitate with tartaric acid; but tartaric acid and starch should not develope a blue colour; should they do so, it indicates the presence of iodate of potassium; for iodic acid, being then liberated by the tartaric acid, acts as an oxidising agent upon the hydriodic acid which is formed at the same time, and sets free the iodine. With nitrate of silver a pale yellow iodide falls, insoluble in solution of ammonia, and the ammoniacal liquid gives with excess of nitric acid no turbidity, showing a freedom from chlorides.

Off. Prep. **Unguentum Potassii Iodidi.** *Iodide of Potassium Ointment.* (Iodide of potassium, sixty-four grains; carbonate of potassium, four grains: distilled water, one fluid drachm; benzoated lard, one ounce. Dissolve the iodide and carbonate in the water, then mix with the lard.)

Linimentum Potassii Iodidi cum Sapone. *Liniment of Iodide of Potassium and Soap.* (Curd soap, two ounces; iodide of potassium, one ounce and a half; glycerine, one fluid ounce; oil of lemons, one fluid drachm; distilled water, ten fluid ounces.)

Iodide of potassium is contained also in linimentum iodi, liquor iodi, tinctura iodi, and unguentum iodi; but in all these preparations it is introduced more on account of its solvent than its therapeutic powers.

Therapeutics. The action of this salt as an iodine preparation is given under the head of iodine (p. 21). Iodide of potassium does not produce the local irritant effects of free iodine, and hence it is better adapted for internal administration. After absorption into the blood it is probable that the effect of an alkaline iodide is almost the same as that of free iodine, and it can hardly be conceived that there is any marked difference between the different iodides, as of potassium and sodium. Iodide of potassium has the power of causing the elimination of mercury from the system, and is administered with advantage after a mercurial course; it also removes lead. It has been administered in large doses (20 gr. to 30 gr. three times a day) to patients suffering from aortic aneurism. Its depresant influence upon the circulation, aided by rest and low diet, probably explains the good results that have sometimes been obtained.

As an external remedy, the ointment and liniment may be conveniently used when the slow action of the iodide upon a diseased part is desired.

Dose. 2 gr. to 10 gr., or more.

Adulteration. The salt may be damp, from the presence of water; it may also contain many impurities, as carbonate of potassium, chlorides of sodium and potassium, iodate of potassium, free iodine, &c., all capable of detection by the tests above given. When iodate of potassium exists in the salt, from the imperfect ignition of the mixed iodide and iodate, the ointment is apt to become yellow, owing to the decomposition of the iodic acid by the animal matter.

POTASSII BROMIDUM. Bromide of Potassium. KBr.

Prep. The same as iodide of potassium, substituting an equivalent quantity of bromine for iodine. $6KHO + Br_6 = 5KBr + KBrO_3 + 3H_2O$.

Prop. In colourless cubic crystals, closely resembling the iodide, with no odour, but a pungent saline taste, readily soluble in water, less soluble in spirit. Its watery solution gives a white crystalline precipitate with tartaric acid. When its solution is mixed with a little chlorine, chloroform agitated with it, on falling to the bottom, exhibits a red colour. A solution of the salt mixed with mucilage of starch and a drop of an aqueous solution of bromine, does not exhibit any blue colour, indicating the absence of iodine. 10 grains require for complete decomposition not less than 838 nor more than 850 grain-measures of the volumetric solution of nitrate of silver.

Therapeutics. Bromide of potassium is the salt most commonly employed when we wish to produce the constitutional effects of bromine; it is devoid of the local irritant properties of free bromine, but after absorption into the blood induces all the peculiar physiological and therapeutic effects of the drug. As yet it has not been employed as an external remedy. (See Bromine, p. 24.)

Dose. 5 gr. to 30 gr.

Adulteration. About twenty years since, bromide of potassium was found by the author to contain iodide of potassium, sometimes to such an amount as to induce iodism when the salt was given in large doses. This adulteration can be detected by the starch test above given. It may likewise contain bromate of potassium.

POTASSII FERROCYANIDUM. Ferrocyanide of Potassium. Yellow Prussiate of Potash. $K_4FeC_6N_6,3H_2O$.

Prep. By fusing animal substances, such as the cuttings of horns, hoofs, and skins, with carbonate of potassium and iron, in an iron pot, lixiviating the crude product with water, and purifying the salt by crystallisation.

Prop. Large yellow crystals, soluble in water, the solution precipitating deep-blue with persulphate of iron, brick-red with sulphate of copper, and white with acetate of lead.

Use. It is employed in the preparation of dilute hydrocyanic acid and cyanide of potassium.

POTASSII CYANIDUM. Cyanide of potassium. KCN.

Prep. By heating ferrocyanide of potassium at a red heat until gas ceases to be evolved. It may be purified by solution in spirit and subsequent crystallisation.

Prop. White opaque deliquescent crystalline masses having the odour of hydrocyanic acid. It is intensely poisonous.

Use. Cyanide of potassium is employed in the preparation of purified bismuth.

POTASSII BICHROMAS. Bichromate of Potassium. K_2CrO_4,CrO_3.

Prop. Large red transparent four-sided tables decomposed at high temperatures into green oxide of chromium and yellow chromate of potassium.

Use. It is used in the preparation of chromic acid and valerianate of sodium.

POTASSA SULPHURATA. Sulphurated Potash. Hepar Sulphuris. Tersulphide of potassium with some sulphate of potassium.

Prep. By mixing together sulphur and carbonate of potassium, and afterwards heating in a crucible till they have combined. The changes are probably $10S + 4K_2CO_3 = 3K_2S_3 + K_2SO_4 + 4CO_2$.

Prop. A brown liver-coloured mass, which is brittle, slightly deliquescent, having a strong odour of sulphuretted hydrogen, especially when moist, and an acrid disagreeable taste; soluble in water, forming a yellow solution; the solution is precipitated by acids, with the deposition of sulphur, and strikes black with the salts of lead. The acid fluid when boiled and filtered is precipitated yellow by perchloride of platinum, and white by chloride of barium. About 50 per cent. (the tersulphide of potassium) should be dissolved by rectified spirit.

Off. Prep. **Unguentum Potassæ Sulphuratæ.** *Ointment of Sulphurated Potash.* (Sulphurated potash, thirty grains; hard paraffin, a quarter of an ounce; soft paraffin, three quarters of an ounce.) Should be used recently prepared.

Therapeutics. In small doses it acts as a stimulant diaphoretic and expectorant, and is sometimes employed in the treatment of chronic skin diseases, as scabies and psoriasis; also in chronic rheumatism, and certain cases of bronchitis; in fact it possesses all the physiological and therapeutic properties which sulphur has when it becomes absorbed into the blood; but on account of its solubility it is much more potent than either sublimed or precipitated sulphur. Externally, this salt may be used in the form of ointment, or as a bath, or lotion, in the treatment of chronic rheumatic and skin affections. It is poisonous in large doses. For the bath four ounces of the salt may be dissolved in thirty gallons of water.

Dose. 2 gr. to 8 gr., in pill.

Adulteration. When exposed, this compound becomes pale from oxidation and the formation of sulphate of potassium.

Sapo Mollis. Soft Soap. A compound containing potassium. It is described under Olive Oil.

SODIUM.

(**Na.** Eq.=23.)

This metal, called also Natrium, does not exist native; when pure it resembles silver in colour, but is soft; sp. gr. 0·97; rapidly oxidises, and forms an oxide, the alkali soda.

Preliminary remarks. Sodic chloride is abundantly present in the healthy organism. It seems to be in some way necessary for tissue-proliferation, whether normal or morbid.

Salts of sodium, when injected into the blood of animals, do not exert any such toxic influence as do those of potassium.

Even large doses do no more than cause transient muscular weakness, and do not appear to affect the heart. It is a curious circumstance that the subcutaneous injection of sodic chloride in the frog causes cataract, and a transudation of red blood-corpuscles through the walls of the capillaries in various regions of the body.

LIQUOR SODÆ. Solution of Soda.

Prep. Carbonate of sodium, twenty-eight ounces; slaked lime, twelve ounces; distilled water, a gallon. Prepared in the same manner as directed for the solution of potash.

Prop. A colourless liquid, with intensely caustic taste; sp. gr. 1·047. 458 grains, by weight (one fluid ounce), require for neutralisation 470 grain-measures of the volumetric solution of oxalic acid, equivalent to 4·1 per cent. by weight of hydrate of sodium (**NaHO**). In most of its characters it resembles liquor potassæ, except that it is not precipitated by perchloride of platinum, or tartaric acid, and is precipitated by a solution of antimoniate of potassium, the antimoniate of sodium being a rather insoluble salt. When heated with an excess of dilute nitric acid and evaporated to dryness, the residue forms with water a clear solution, which is rendered turbid by chloride of barium and by nitrate of silver, but not by ammonia, indicating traces of sulphates and chlorides, and the absence of metallic impurities (iron, &c.). One fluid ounce contains 18·8 grains of hydrate of sodium.

Therapeutics and Use. The action upon the system is probably almost the same as that of liquor potassæ, but it is seldom administered. It is employed in the preparation of sulphurated antimony, and in other processes.

Dose. 10 min. to 1 fl. drm., freely diluted.

SODA CAUSTICA. Caustic Soda; Hydrate of Sodium, **NaHO**, not quite pure.

Prep. Made by evaporating solution of soda to an oily consistence, and pouring it on a clean silver or iron plate to solidify.

Prop. In whitish fragments or cakes, alkaline and corrosive. It imparts a yellow colour to flame; its solution in water acidulated by nitric acid gives scanty white precipitates with nitrate of silver and chloride of barium. 40 grains dissolved in water leave scarcely any sediment, and require for neutralisation about 900 grain-measures of the volumetric solution of oxalic acid.

Therapeutics. Soda may be employed externally as a caustic, in the same manner as potash. It is less deliquescent, and therefore more convenient, but likewise probably somewhat less powerful. It may be cast into sticks for medicinal use.

SODII CARBONAS. Carbonate of Sodium. $Na_2CO_3,10H_2O$.

Prep. It is commonly made from common salt, by converting the chloride of sodium into a sulphate by means of sulphuric acid, and afterwards, by combustion with small coal and chalk, resolving this salt into a sulphide, and then into a carbonate ; it is manufactured on a very large scale.

Prop. In large rhombic octahedra, colourless, transparent, except on the surface, with an alkaline and caustic taste ; it effloresces and crumbles when exposed to air ; it imparts a yellow colour to flame ; very soluble in water ; dissolves with effervescence in hydrochloric acid, forming a solution which does not precipitate with perchloride of platinum. By heat it undergoes aqueous fusion, and loses 63 per cent. of its weight. When supersaturated with nitric acid it precipitates slightly, or not at all, with chloride of barium or nitrate of silver. 143 grains require for neutralisation at least 960 grain-measures of the volumetric solution of oxalic acid.

20 gr. of carbonate of sodium neutralise 9·7 gr. of citric and 10·5 gr. of tartaric acid.

SODII CARBONAS EXSICCATA. Dried Carbonate of Sodium. Na_2CO_3. Apply heat to the carbonate, until the crystals fall to powder, and afterwards heat it to redness ; lastly, rub it to powder. It is simply the last described salt deprived of its water of crystallisation ; it is soluble in water.

Therapeutics. The action of carbonate of sodium resembles that of the corresponding salt of potassium, but is less caustic. The general effects of sodium salts will be described under Sodii Bicarbonas.

Dose. 10 gr. to 30 gr. Of dried carbonate of sodium, 3 gr. to 10 gr. ; this last is convenient when it is desired to administer the drug in powder or pill.

Adulteration. It usually contains a little sulphate of sodium, detected by the chloride of barium test above given.

SODII BICARBONAS. Bicarbonate of Sodium. $NaHCO_3$.

Prep. From the carbonate, in the same way as the bicarbonate of potassium is prepared, or by the reaction of chloride of sodium and bicarbonate of ammonium.

Prop. It forms an opaque white powder, or minute crystals, slightly alkaline, and not caustic; imparts a yellow colour to flame; soluble in water; it dissolves with much effervescence in dilute hydrochloric acid, forming a solution which does not precipitate with perchloride of platinum. A solution of the salt in cold water gives a white precipitate with solution of perchloride of mercury, which is oxychloride of mercury, but subsequently the red carbonate forms. Supersaturated with nitric acid, its solution scarcely precipitates with chloride of barium or nitrate of silver. 84 grains exposed to a red heat leave 53 grains of an alkaline residue (carbonate of sodium), which requires for neutralisation 1000 grain-measures of the volumetric solution of oxalic acid. 20 grains of bicarbonate of sodium neutralise 16·7 grains of citric and 17·8 grains of tartaric acid.

Off. Prep. **Liquor Sodæ Effervescens.** *Effervescing Solution of Soda. Soda Water.* (Bicarbonate of sodium, thirty grains; water, a pint. Dissolve, filter, and pass into the solution as much carbonic acid gas as can be introduced under a pressure of four atmospheres.)

Trochisci Sodii Bicarbonatis. *Bicarbonate of Sodium Lozenges.* (Bicarbonate of sodium, three thousand six hundred grains; refined sugar, twenty-five ounces; gum acacia, an ounce; mucilage of gum acacia, two fluid ounces; distilled water, a fluid ounce. Mix and make 720 lozenges.) Each lozenge contains five grains of the bicarbonate.

The bicarbonate is also contained in sodii citro-tartras effervescens.

Therapeutics. Very similar to bicarbonate of potassium, except that the urate of sodium is very much less soluble than the potassium salt, and hence sodium is less adapted for the treatment of the uric acid diathesis. At 100° F. (37°·8 C.) urate of sodium requires 1130 parts of distilled water to dissolve it; urate of potassium only 500. Some practitioners are of opinion that the bicarbonate of sodium agrees better with the stomach than the potassium salt, and it probably influences the secretions of the liver more than the bicarbonate of potassium, and has less power in causing diuresis. The author once knew a patient suffering from chronic eczema, in whom, when bicarbonate of potassium was given, nausea was always induced, attended with increase of the skin affection, but no such symptoms were caused by the exhibition of the corresponding salt of sodium. Other differences probably exist, but are not yet well made out.

Dose. 10 gr. to 60 gr.; of the lozenges, 1 to 6.

Adulteration. Carbonate and sulphate of sodium in an efflorescent state, detected by the magnesia and chloride of barium tests.

SODII ARSENIAS. See Arsenical Preparations.

SODII SULPHAS. Sulphate of Sodium; Glauber's Salt. $Na_2SO_4,10H_2O$.

Prep. By treating common salt with sulphuric acid in the process for making hydrochloric acid, and neutralising with carbonate of sodium; it is found native, and exists in sea-water.

Prop. In six-sided oblique rhombic prisms, which are deeply channelled; colourless, transparent, neutral, with a bitter saline taste; effloresces in air, soluble in water; insoluble in spirit. Heated, it loses 55·9 per cent. of water. Heated with solution of potash no odour of ammonia is evolved and no precipitate is formed. It imparts a yellow colour to flame. 100 grains of it dissolved in water and acidulated with hydrochloric acid, give, by the addition of chloride of barium, a white precipitate (sulphate of barium) which when washed and dried weighs 72·2 grains.

Therapeutics. It acts as a saline purgative, probably influencing the biliary secretions; in small doses as a diuretic; it was formerly much employed, but at present sulphate of magnesium is generally substituted for it, on account of its more agreeable taste. The so-called Cheltenham salts consist chiefly of sulphate of sodium; and this salt is also the principal constituent of the Carlsbad waters.

Dose. $\frac{1}{4}$ oz. to 1 oz. When effloresced, the dose is smaller.

SODII SULPHIS. Sulphite of Soda. $Na_2SO_3,7H_2O$.

Prep. Formed by saturating a solution of carbonate of sodium with sulphurous acid gas, and crystallising.

Prop. White prisms, having a slight odour of sulphurous acid: soluble in water.

Therapeutics. It is a decided antiseptic, arresting the development of bacteroid organisms in neutral solutions, and so preventing putrefaction. It has been used with good effect in enteric fever and septic conditions of the blood. In large doses it is said to check ammoniacal decomposition of the urine in the bladder. It has also been recommended as a substitute for quinine in the treatment of ague; but its efficacy in this respect is questionable.

It has been given, with seemingly good effect, in many cases of chronic vomiting, accompanied by the presence of sarcinæ in the vomited matter.

Dose. 5 gr. to 20 gr.

HYPOSULPHITE OF SODIUM. Thiosulphate of Sodium. Appendix. $Na_2S_2O_3, 5H_2O$.

It occurs in large rhombic prisms with oblique faces, which are very soluble in water. The hyposulphite of sodium, in common with other soluble hyposulphites, has the property of rendering colourless a solution of iodine ; the explanation of this phenomenon will be found among the volumetric tests.

Use. It is introduced into the Appendix of the Pharmacopœia for the formation of one of the volumetric solutions. See Appendix.

Therapeutics. The antiseptic power of the hyposulphite in neutral or alkaline solutions is very inferior to that of the sulphite. As a constitutional remedy it is valueless. Its therapeutic properties are due to the fact that it is decomposed by acids, free sulphur and sulphurous acid being produced. Hence, in cases of sarcinous vomiting, it may be administered to check the fermentation of food in the stomach. Again, it is extremely valuable as an external application in all forms of parasitic skin disease ; for it exhibits all the efficacy of sulphurous acid without the irritant property of the latter. It is probable that in both cases the acid of the gastric juice, and that of the perspiration, may be respectively essential to bring out the therapeutic effect of the salt.

Dose. 10 gr. to 60 gr.

SODII NITRAS. Nitrate of Sodium. $NaNO_3$.

Prop. A deliquescent salt crystallising in obtuse rhombohedra. It is soluble in about two parts of cold water ; the solution should give no precipitate with nitrate of silver or chloride of barium, showing the absence of chlorides and sulphates. Thrown on a fire it deflagrates ; warmed with sulphuric acid and copper wire, it evolves red fumes.

Use. It is not employed in medicine, but is introduced for making the arseniate of sodium.

SODII PHOSPHAS. Phosphate of Sodium. Na_2HPO_4, $12H_2O$.

Prep. Formed by digesting bone ash (phosphate of calcium) in sulphuric acid, when sulphate of calcium and acid phosphate of calcium are formed ; adding carbonate of sodium till carbonate of calcium is no longer formed and the solution is slightly alkaline, whereby phosphate of sodium is formed ; filtering and crystallising.

Prop. In transparent, oblique, rhombic prisms, with a mild saline taste, efflorescing in the air. It imparts a yellow colour to flame, is faintly alkaline in reaction, very soluble in water ; with nitrate of silver it throws down the yellow phosphate, the resulting fluid acquiring an acid reaction, owing to the liberation of nitric acid ($Na_2HPO_4 + 3AgNO_3 = Ag_3PO_4 + 2NaNO_3 + HNO_3$) ; it loses 63 per cent. of water at a dull red heat, and the remaining salt dissolved in water gives with chloride of barium a precipitate entirely soluble in dilute nitric acid, and with nitrate of silver a precipitate of a white colour, owing to the change of the tribasic phosphate (Na_2HPO_4) into the pyrophosphate ($Na_4P_2O_7$) by the action of heat.

Therapeutics. In large doses it acts as a mild saline purgative ; in smaller ones as a diuretic, altering also the condition of the urine, rendering it alkaline, and increasing its solvent power for uric acid ; sometimes employed as a pleasant purgative for children and delicate persons, and frequently in the uric acid diathesis ; in many patients the exhibition of small doses of this salt causes disturbance of the stomach and bowels, and prevents its employment as a lithontriptic.

Dose. As a purgative, ½ oz. to 1 oz. ; as a diuretic, 30 gr. to 120 gr.,—given in mutton broth it is almost tasteless.

Adulteration. It frequently contains a little phosphate of calcium, which renders the solution milky.

SODII HYPOPHOSPHIS. Hypophosphite of Sodium. $NaPH_2O_2$.

Prep. By adding carbonate of sodium to a solution of hypophosphite of calcium as long as a precipitate of carbonate of calcium is formed. The solution is then filtered and evaporated to dryness by the heat of a steam-bath, keeping it constantly stirred when the salt begins to solidify. It sometimes explodes spontaneously while evaporation is going on.

Prop. A white, granular salt, with a bitter nauseous taste. It is deliquescent, very soluble in water and spirit (differing in this respect from the hypophosphite of calcium), but insoluble in ether.

At a red heat it ignites and gives off inflammable phosphuretted hydrogen.

Therapeutics. Similar to Calcis Hypophosphis, *quod vide.*

Dose. 5 gr. to 10 gr.

BORAX. Borax. Biborate of Sodium. $Na_2B_4O_7,10H_2O$.

Prep. Found native in Thibet, and imported from India as tincal or crude borax; made also in Tuscany by neutralising the boric acid, obtained from the lagoons, with carbonate of sodium.

Prop. Flattened six-sided prisms, semi-transparent, with a slight alkaline reaction and saline taste, efflorescent; insoluble in rectified spirit; soluble in water, especially when hot; and from this solution, on the addition of any of the mineral acids, crystalline scales of boric acid are thrown down; the solution of boric acid in spirit burns with a green flame; it loses its water and fuses when heated. 191 grains dissolved in 10 fluid ounces of distilled water require for saturation 1000 grain-measures of the volumetric solution of oxalic acid.

Off. Prep. **Mel Boracis.** *Honey of Borax.* (Powdered borax, sixty grains; glycerine, thirty grains; clarified honey, four hundred and eighty grains. Mix.)

Glycerinum Boracis. *Glycerine of borax.* (Borax powdered, one ounce; glycerine, four fluid ounces; distilled water, two fluid ounces. Mix.) Also used in the preparation of Acidum Boricum.

Therapeutics. Borax acts as a mild alkali upon the alimentary canal, and after absorption tends to render the fluids alkaline, and to produce diuresis: other powers have been attributed to it, viz., a specific action upon the uterus, causing contraction; this power is very questionable. It is also stated to have the power of checking the zymotic action of yeast, diastase, emulsine, and myrosin. It is used sometimes as a diuretic and antacid, sometimes combined with ergot to produce expulsion of the placenta, and as an emmenagogue. Borax produces a peculiar topical sedative or soothing influence when applied to mucous membranes; and it is used mixed with honey or glycerine, or as a gargle, in aphthous conditions of the tongue and throat, and in mercurial salivation. It is also advantageously employed in the form of an injection in irritable conditions of the vagina and uterus, and as a lotion in pruritus of the pudendum or anus.

Dose. 5 gr. to 40 gr.

LIQUOR SODÆ CHLORINATÆ. Solution of Chlorinated Soda.

Prep. Dissolve twenty-four ounces of carbonate of sodium in two pints of distilled water; thoroughly triturate sixteen ounces of chlorinated lime with six pints of distilled water, and filter; mix the solutions and again filter. The resulting solution of hypochlorite of sodium (**$NaClO$**) should have sp. gr. 1·054, and only a small amount of bicarbonate of sodium should be present.

Prop. A colourless alkaline liquid, having the odour of chlorine, a pungent taste, with the power of bleaching vegetable colours, turmeric paper being first made brown, and the colour afterwards speedily destroyed; indigo is also decolorised by it; it effervesces with hydrochloric acid, evolving chlorine and carbonic acid, and forming a solution which does not precipitate with perchloride of platinum. When exposed to the air, from the absorption of carbonic acid, and more especially when an acid is added to it, free chlorine is evolved. It is not precipitated by oxalate of ammonium. 70 grains by weight, added to a solution of 20 grains of iodide of potassium in 4 fluid ounces of water, and acidulated with 2 fluid drachms of hydrochloric acid, require for the discharge of the brown colour which the mixture assumes (from the liberation of iodine) 500 grain-measures of the volumetric solution of hyposulphite of sodium, equivalent to about 2·5 per cent. of available chlorine.

Off. Prep. **Cataplasma Sodæ Chlorinatæ.** *Chlorine Poultice.* (Boiling water, eight fluid ounces; linseed meal, four ounces; solution of chlorinated soda, two fluid ounces. Stir constantly, add the linseed to the water by degrees, then mix in the chlorinated soda.)

Therapeutics. Internally it acts as an antiseptic and stimulant, and has been given with success in low malignant fevers, as scarlatina, &c. Externally, in the form of cataplasm or solution, it is applied to correct the fœtor of unhealthy or gangrenous parts, and also to stimulate to more healthy action. As a gargle it is useful in ulcerated sore throats, and in ulcerated mouths from the use of mercury. (*See* Liquor Chlori.)

Dose. 10 min. to 20 min., or more, diluted with 1 fl. oz. of water; or as a gargle, ½ fl. oz. to 1 fl. oz. in the ½ pint of water.

The test of its goodness is the free evolution of chlorine when an acid is added to it.

SODII CHLORIDUM. Chloride of Sodium. Common Salt. **$NaCl$.**

Found in Cheshire as rock-salt, and in brine springs; also in sea-water, &c.

Prop. Transparent cubes, or small white grains, free from moisture, soluble in water and spirit, but not in absolute alcohol, imparting a yellow colour to flame. The solution is not precipitated by perchloride of platinum, but gives a white precipitate with nitrate of silver, soluble in ammonia, but insoluble in nitric acid.

Therapeutics. A necessary article of food, contained in blood and other animal fluids. A deficiency of it causes disease. In large doses it is emetic and purgative; in smaller doses, it acts as a slight stimulant and alterative. Externally applied, it is also stimulant and rubefacient. Sometimes used in the form of sea-water as an emetic, purgative, and anthelmintic; also as an adjunct to clysters: its internal employment, however, is chiefly as a condiment. Sponging and bathing in salt water, with or without friction, are valuable aids in many affections, as chronic muscular rheumatism, joint affections, &c.

Dose. A tablespoonful or more as an emetic.

SODII BROMIDUM. Bromide of Sodium. **$NaBr$.**

Prep. Prepared in the same way as bromide of potassium, solution of soda being used instead of solution of potash, and crystallisation being conducted from warm solutions.

Prop. A granular white powder consisting of minute monoclinic crystals, somewhat deliquescent, inodorous, with a saline taste. It is readily soluble in less than twice its weight of water. It gives the usual tests for sodium and bromine; when mixed with mucilage of starch and a drop of an aqueous solution of chlorine or bromine it does not exhibit any blue colour (absence of iodide).

Therapeutics. Employed in the same diseases as bromide of potassium. It has less influence on the heart, and is less irritating to the stomach.

Dose. 10 gr. to 30 gr.

SODII IODIDUM. Iodide of Sodium. **NaI.**

Prep. Prepared like iodide of potassium, solution of soda being used in place of solution of potash.

Prop. A dry white crystalline deliquescent powder with a saline and somewhat bitter taste. Readily soluble in water. It gives the usual tests of sodium and iodine. Ten grains require for complete precipitation about 660 grain-measures of the volumetric solution of nitrate of silver.

Therapeutics. Similar to iodide of potassium; it irritates the stomach less and may be given in larger doses.

Dose. 3 gr. to 10 gr.

SODA TARTARATA. Tartarated Soda. Tartrate of Sodium and Potassium. Rochelle Salt. $NaKC_4H_4O_6,4H_2O$.

Prep. Add sixteen ounces of acid tartrate of potassium to twelve ounces of carbonate of sodium dissolved in four pints of boiling water, when the basic equivalent of hydrogen is replaced by one of sodium and carbonic acid is given off. If after being boiled for a short time the liquid is acid or alkaline, it must be neutralised by carbonate of sodium or acid tartrate of potassium as required. Boil and filter, concentrate and crystallise.

Prop. In colourless, transparent prisms, or halves of prisms, of the rhombic order, generally eight-sided, neutral in reaction, entirely soluble in cold water, tasting like common salt. Nitrate of silver and chloride of barium throw down no precipitate, or only such as is dissolved by water. Heated with sulphuric acid it blackens and evolves inflammable gas and the odour of burned sugar. It imparts a yellow colour to flame. A strong solution gives a crystalline precipitate of acid tartrate of potassium, on the addition of a small quantity of acetic acid. 141 grains heated to redness till gases cease to be evolved, leave an alkaline residue, which requires for neutralisation 990 grain-measures of the volumetric solution of oxalic acid.

Therapeutics. A mild saline purgative, in large doses; in smaller ones, diuretic; and producing an alkaline condition of the fluids in the same way as tartrate of potassium; it is employed under exactly similar circumstances.

Dose. As a purgative, 120 gr. to ½ oz.; as a diuretic, 30 gr. to 60 gr.

SODII CITRO-TARTRAS EFFERVESCENS. Effervescent Citro-tartrate of Sodium.

Prep. Mix seventeen ounces of bicarbonate of sodium, nine ounces of tartaric acid, and six ounces of citric acid, in powder.

Heat to between 200° and 220° F. (93°·3 and 104°·4 C.), stir till granular, pass through suitable sieves, and keep dry.

Therapeutics. The same as the tartarated soda, but it is more pleasant to the taste, and the carbonic acid evolved causes it to produce less discomfort in the stomach.

Dose. 60 gr. to $\frac{1}{4}$ oz.

LIQUOR SODII ETHYLATIS. Solution of Ethylate of Sodium. $\mathbf{NaC_2H_5O}$.

Prep. By acting with twenty-two grains of metallic sodium on a fluid ounce of ethylic alcohol contained in a flask, the latter being kept cool in a stream of cold water. The solution should be recently prepared.

Prop. A colourless syrupy liquid, becoming brown by keeping. Sp. gr. 0·867. When heated, it boils and gives off alcoholic vapours, leaving a white salt, consisting of sodium ethylate, which chars on being strongly heated. This salt, mixed with water and heated, yields alcohol, and the solution on evaporation leaves a residue consisting wholly of caustic soda. The official solution of ethylate of sodium contains 19 per cent. of the solid salt, $\mathbf{NaC_2H_5O}$.

Therapeutics. A very manageable and effective caustic, useful for destroying nævi and other vascular growths, and causing little or no pain. It should be applied by means of a pointed glass rod.

Soap, Valerianate of Sodium, Sulphocarbolate of Sodium, and Salicylate of Sodium will be treated of under the heads of Olive Oil, Valerian, Carbolic Acid, and Salicylic Acid.

SCHOOL OF MEDICINE

STANNUM. TIN.

(Sn. Eq. 118.)

GRANULATED TIN. *See* Appendix.

SOLUTION OF CHLORIDE OF TIN. *See* Appendix.

Neither the chloride of tin, nor in fact any of the salts of this metal, are commonly employed as remedies. They have however, been administered in the treatment of some nervous affections, as epilepsy and chorea, in the same way as the salts of zinc and silver: also in some chronic forms of skin disease, No good clinical investigation of the action of tin salts has yet been made.

ZINCUM. ZINC.

(Zn. Eq. =65.)

ZINC, AND GRANULATED ZINC. *See* Appendix.

Prep. Obtained from the sulphide, Blende, or the native carbonate, Calamine, by distillation with carbonaceous matters. Granulated zinc is prepared by fusing zinc and pouring it into cold water.

Prop. A bluish-white crystalline metal; sp. gr. 6·86; soluble in dilute hydrochloric and sulphuric acids, with evolution of hydrogen; also in nitric acid. The gas evolved on the addition of pure sulphuric acid does not blacken a piece of paper moistened with acetate of lead, and when ignited gives no dark stain to the lid of a porcelain crucible held low down in the flame, showing that the metal is free from sulphur and arsenic. The precipitate thrown down by ammonia is redissolved by excess of that reagent. Used in pharmacy for the preparation of the chloride and sulphate.

CALAMINA PRÆPARATA. Prepared Calamine.

Prep. Native carbonate of zinc, calcined in a covered earthen crucible at a moderate temperature, powdered, and freed from gritty particles by elutriation.

Prop. A pale pinkish-brown powder, almost entirely soluble in acids with effervescence.

Off. Prep. **Unguentum Calaminæ.** *Ointment of Calamine.* (Prepared calamine, one ounce; benzoated lard, five ounces.)

Therapeutics. Owing to its colour it is often employed externally instead of the oxide of zinc as a dusting powder. The ointment is useful in cases of eczema.

ZINCI OXIDUM. Oxide of Zinc. **ZnO.**

Prep. Made by heating the carbonate of zinc in a loosely covered crucible exposed to a dull red heat, till a portion taken from the centre, when cool, does not effervesce when dropped into dilute sulphuric acid; the carbonic acid is driven off, and the oxide of zinc remains.

Prop. A white powder, without odour or taste, becoming pale yellow by heat, insoluble in water but soluble in hydrochloric and other acids. The solution in diluted nitric acid is not affected by chloride of barium or nitrate of silver, and gives a white precipitate with carbonate of ammonium, which dissolves entirely without colour in excess of the reagent, forming a solution which is precipitated white by sulphydrate of ammonium; the three last reactions indicating the absence of sulphates, chlorides, alumina, iron, or other metallic impurities.

Off. Prep. **Unguentum Zinci.** *Ointment of Zinc.* (Oxide of zinc, eighty grains; benzoated lard, one ounce. Mix them together.)

Therapeutics. Oxide of zinc, if given in large doses, causes vomiting, but it is seldom or never used as an emetic. In small doses it becomes absorbed and acts as a tonic and astringent; its tonic effects are exerted chiefly upon the nervous system, as is seen in cases of chorea, epilepsy, hysteria, neuralgia, and whooping cough; as a general astringent it is useful in cases of colliquative sweating. When long continued and in large doses, it has been said to cause a species of tabes sicca, or dry wasting. Externally it is employed as a desiccant and astringent upon excoriated surfaces and slight ulcerations, either as the ointment, or alone, or mixed with starch and dusted upon the parts.

Dose. 2 gr. to 10 gr. or more, in pill or powder.

Adulteration. Chalk, carbonate of magnesium; detected by effervescing, and the special tests of these bodies. Starch has sometimes been used to adulterate this oxide.

ZINCI CHLORIDUM. Chloride of Zinc. **$ZnCl_2$.**

Prep. Made by dissolving granulated zinc in hydrochloric acid, digesting for some hours with heat; if a few drops of the resulting liquid gives a black precipitate with excess of ammonia and sulphydrate of ammonium, indicating the presence of iron, the liquid is filtered and solution of chlorine is added until the fluid acquires a permanent odour of that gas; afterwards carbonate of zinc is added in small quantities at a time, until a brown sediment of peroxide of iron appears; this is separated, and the fluid evaporated to a proper consistence and poured into moulds to solidify.

If no iron is present, the solution in hydrochloric acid is filtered, evaporated, and poured into moulds.

Prop. A white, crystalline, semi-transparent mass, in rods or tablets, caustic, rapidly absorbing water if exposed to the air, and very deliquescent; soluble in rectified spirit, in water, and in ether. The watery solution is precipitated white by sulphydrate of ammonium and nitrate of silver; but, if first acidulated with hydrochloric acid, it is not affected by sulphuretted hydrogen. The aqueous solution is likewise precipitated by ammonia and potash, but the precipitate is redissolved by excess of these reagents; also precipitated by carbonate of sodium or potassium, but not redissolved by excess; it is not affected by chloride of barium or oxalate of ammonium, and is not tinged blue by ferro- or ferricyanide of potassium; showing the absence of sulphates, lime, or iron.

Off. Prep. **Liquor Zinci Chloridi.** *Solution of Chloride of Zinc.* (Granulated zinc, one pound; hydrochloric acid, forty-four fluid ounces; solution of chlorine, a sufficiency; carbonate of zinc, half an ounce; water, a pint. The chlorine and carbonate of zinc are only to be employed if iron is found to be present, as in the preparation of chloride of zinc. Dissolve and reduce to two pints.) Contains 366 gr. in one fluid ounce. Sp. gr. 1·460.

Therapeutics. When applied externally in substance, or made into a paste with flour or gypsum, it acts as a powerful escharotic from its power of combining with some of the proximate elements of the tissues; when in solution, as an irritant and astringent. Chloride of zinc is seldom given as an internal remedy, although it has occasionally been employed in chorea and epilepsy. Externally it is used in the treatment of cancerous affections, intractable and malignant ulcers, and the removal of nævi. The use of gypsum or flour is to prevent the action from being extended too far, owing to the deliquescent nature of the salt.

A solution of chloride of zinc, sp. gr. 2·0, is used as a deodoriser and disinfectant, under the name of Sir W. Burnett's Solution.

Dose. Internally, ½ gr. to 1 gr. or 2 gr.

ZINCI SULPHAS. Sulphate of Zinc; White Vitriol. $ZnSO_4,7H_2O$.

Prep. By dissolving zinc in dilute sulphuric acid, filtering and mixing with a solution of chlorine, and subsequently adding carbonate of zinc, as directed in the preparation of the chloride; evaporating and crystallising.

Prop. In large or small crystals, of the same form as sulphate of magnesium; slightly efflorescent; soluble in water; precipitated and again redissolved by ammonia; precipitated by chloride of barium and sulphydrate of ammonium. Its watery solution is not tinged purple by tincture of galls, showing absence of iron, and when acidulated with hydrochloric or sulphuric acid is not precipitated by sulphuretted hydrogen, showing absence of arsenic, copper, and lead. Boiled a few minutes with a little nitric acid, it yields with ammonia a white precipitate, entirely soluble without colour in excess of the reagent, showing the absence of iron, &c.

Therapeutics. In small doses, sulphate of zinc acts as an astringent and nervine tonic ; in large doses as a quick, direct emetic ; externally, as a powerful astringent. It is used as a tonic chiefly in diseases of the nervous system, as in chorea, epilepsy, hysteria, and allied spasmodic affections ; when the dose is gradually increased, a tolerance soon becomes established. The author had an epileptic patient under his care who has taken from 10 to 15 grains of the salt twice a day for about four years, without having experienced any unpleasant symptom from the remedy. Sulphate of zinc is sometimes given as an astringent in chronic passive discharges, as in leucorrhœa, gleet, and bronchorrhœa. In large doses, as an emetic, it is used when the rapid emptying of the stomach is desired without the production of much depression, as in narcotic poisoning, phthisis, and dyspepsia. Externally, in solutions of different strengths, it is employed as a lotion or injection, as in ophthalmia, gleet, leucorrhœa, &c.

Dose. As a tonic, or astringent, 1 gr. to 3 gr., in pills, or solution ; as an emetic, 10 gr. to 30 gr. Externally, from 1 gr. to 10 gr. may be dissolved in an ounce of water.

ZINCI CARBONAS. Carbonate of Zinc. $ZnCO_3(Zn2HO)_2$, H_2O.

Prep. By precipitating a solution of sulphate of zinc with carbonate of sodium, washing and drying the precipitate.

Prop. A white powder, without odour or taste, insoluble in water, soluble with effervescence, and without residue, in dilute nitric acid ; this solution gives no precipitate with chloride of barium or nitrate of silver ; and with carbonate of ammonium, a white precipitate (carbonate of zinc) entirely soluble without colour in excess of the reagent, forming a solution which is precipitated white by sulphydrate of ammonium.

Therapeutics. Not much employed as a medicinal agent ; it may be used in the same cases as the oxide, both internally and externally ; its action is probably identical with that of the oxide of zinc. Dr. Marcet has proposed its administration in solution in carbonic acid in cases of chronic alcoholic poisoning.

Dose. 1 gr. to 10 gr. in pill or powder.

ZINCI ACETAS. Acetate of Zinc. $Zn(C_2H_3O_2)_2,2H_2O$.

Prep. By dissolving carbonate of zinc in acetic acid, evaporating and crystallising.

Prop. In thin colourless plates, of a pearly lustre, and a sharp unpleasant taste; evolving acetic acid when decomposed by sulphuric acid. Soluble in water, giving a white precipitate with sulphuretted hydrogen. A dilute watery solution is not affected by chloride of barium or nitrate of silver, and when slightly acidulated with hydrochloric acid, is not precipitated by sulphuretted hydrogen. Boiled for a few minutes with a little nitric acid, it yields with ammonia a white precipitate, entirely soluble, without colour, in excess of the reagent.

Therapeutics. Acetate of zinc, as far as has been clinically determined, acts in a manner very similar to the sulphate of the metal; producing either vomiting, or a tonic and astringent effect, according to the dose. It is chiefly employed as an external agent for the same purposes as sulphate of zinc, to which latter it is preferred by many, especially in gonorrhœa. It has long been prescribed as an extemporaneous preparation made by mixing acetate of lead with sulphate of zinc.

Dose. 1 gr. to 2 gr. as a tonic; 10 gr. to 20 gr. as an emetic. As a lotion or injection, 1 gr. to 10 gr., to the fluid ounce of water.

VALERIANATE, OLEATE, and SULPHOCARBOLATE OF ZINC are described under the head of Valerian, of Oleic Acid, and of Carbolic Acid

ALCOHOLIC AND ETHEREAL PREPARATIONS, CHLOROFORM, ETC.

ALCOHOL ETHYLICUM. Ethylic Alcohol. Absolute Alcohol. C_2H_5HO.

Prep. Rectified spirit, a pint; carbonate of potassium, anhydrous, two ounces; chloride of calcium, fused, a sufficiency. Mix the carbonate of potassium with the rectified spirit; heat the chloride of calcium to redness in a covered crucible, and, after breaking it into small fragments, put one pound of it into a flask; add to it the spirit from which the denser aqueous solution of carbonate of potassium has been completely separated. Distil (after it has stood in the apparatus for twenty-four hours) at a gentle heat, till two fluid ounces have passed over; return this to the flask, and continue the distillation until fifteen fluid ounces have been recovered.

Prop. A limpid, colourless liquid, of a pungent, spirituous odour; sp. gr. 0·797 to 0·800, rapidly absorbing water; it is a very powerful solvent of certain substances, as alkaloids, pure alkalies, volatile oils, iodine, &c.; it does not dissolve common salt, which is soluble in ordinary rectified spirit. It is not rendered turbid when mixed with water, and does not give rise to a blue colour when in contact with anhydrous sulphate of copper; it is entirely volatilised by heat: these tests indicating freedom from oily matters, or other impurities.

Use. It is never administered as a medicine, but is used in the preparation of Chloroform and of Liquor Sodii Ethylatis, and is employed as a solvent, and to test the purity of some chemical substances.

SPIRITUS RECTIFICATUS. Rectified Spirit.

Alcohol, $\mathbf{C_2H_5HO}$, with sixteen per cent. of water.

Prep. Alcohol is a product of the vinous fermentation of sugar, occurring in wine, malt liquors, &c.: these, when distilled, afford spirits, such as brandy and rum; and redistilled, give rectified spirit. It is usually procured from malt.

Prop. It resembles alcohol in most of its properties: sp. gr. 0·838. It burns with a blue flame without smoke; odour and taste, alcoholic; it should not be made cloudy by the addition of water, nor tinged red with sulphuric acid. It contains about 84 per cent. of absolute alcohol. 4 fluid ounces, with 30 grain-measures of the volumetric solution of nitrate of silver, exposed for 24 hours to a bright light, and then decanted from the black powder which has formed, undergo no further change when again exposed to light with more of the test; indicating the presence of but a small amount of fousel oil and aldehyd, both of which are capable of reducing nitrate of silver. Alcohol when pure undergoes no change under the influence of this salt and a bright light.

Off. Prep. **Spiritus Tenuior.** *Proof Spirit.* (By adding to every five pints of rectified spirit, three pints of distilled water.) It contains, by weight, about 49 per cent., and, by volume, about 57 per cent., of absolute alcohol, Sp. gr. 0·920.

Use. Rectified spirit is employed in pharmacy in making many tinctures and spirits, when the substances contain a large amount of resin or volatile oil. *Proof spirit* is used when the drugs are not very rich in such principles. See Introduction under the head *Tinctures.*

Therapeutics. Externally, spirit is employed mixed with water in the form of a lotion, as a stimulant application, as to sore nipples, &c. Eau de Cologne is often employed instead of simple spirit on account of its agreeable odour. (*See* Arnica.)

SPIRITUS VINI GALLICI. French Brandy; Spirit distilled from French wine.

Prop. & Comp. Brandy contains from 49 to 53 per cent. of alcohol, together with some volatile oil and œnanthic ether; it is almost white when first distilled, but in the cask acquires some colour; burnt sugar is often added to it to produce the same effect.

Off. Prep. **Mistura Spiritus Vini Gallici.** *Mixture of French Brandy.* (French Brandy, cinnamon water, each, four fluid ounces; the yolks of two eggs; refined sugar, half an ounce. Rub the yolks and sugar together, then add the cinnamon water and spirit.)

Therapeutics. The effect produced by alcohol on a healthy individual may be divided into three stages:

1. The face is flushed, the pulse and respiration are quickened, there is a sensation of warmth all over the body, with increased muscular and mental energy.

2. The exhilaration passes over into excitement, sometimes amounting to furious delirium. Co-ordinating power over muscular movements is impaired, especially over those of the tongue (thick utterance), of the eyeballs (double vision), of the limbs (staggering gait). The cutaneous sensibility is blunted. Vomiting sometimes occurs.

3. The excitement is followed by drowsiness, passing into coma with stertorous breathing. There is almost complete sensory and motor paralysis. Pulse usually slow and compressible. Death occurs by asphyxia from paralysis of the respiratory centre.

As regards the effect of alcohol on the different functions taken separately, the following facts have been experimentally determined. It causes dilatation of the systemic arterioles, followed by quickening of the heart's action and fall of blood-pressure. The temperature of the body is lowered; this occurs so soon after the introduction of the alcohol that it must be ascribed to increased loss of heat from the skin in consequence of relaxation of the cutaneous vessels. The fall of temperature is much greater in pyrexial states than in health; especially when the fever has been artificially induced by the injection of septic matter into the animal's veins. The cooling is here attributed to diminished oxidation (Binz). Alcohol resembles quinine in its effect on protoplasm, retarding or abolishing its amœboid movements, and hindering its proliferation. The amount of tissue-metamorphosis, measured by the urea and carbonic acid excreted, is said to be diminished; but this is denied by Dr. Parkes.

The question whether alcohol is destroyed in the organism, or eliminated in the urine, is still under discussion. There seems to be no doubt that the theory of its being eliminated unchanged rests on an error of observation. It is highly probable that small doses are entirely decomposed in the system, while larger ones are partially removed by the lungs and kidneys. The peculiar odour noticed in the breath after alcohol has been taken should rather be ascribed to the œnanthic and other ethers contained in wine and brandy, than to the alcohol itself. (Anstie, Binz, Dupré, &c.)

Brandy is medicinally employed with the following ends in view:—

1. To rouse the circulation in states akin to collapse, whatever may be their immediate cause.

2. To deaden pain and cause sleep.

3. To lower the temperature of the body in fevers and acute inflammations.

4. To check or retard suppuration in erysipelas, pyæmia, &c.

5. To assist digestion. In small doses, alcohol stimulates the secretion of gastric juice. Larger doses, mixed with food, hinder the solvent action of pepsin.

6. Externally, to promote the healing of bruises, cracked nipples, bed-sores, &c. (*See* Arnica.)

Dose. Of Brandy, from one to two tablespoonfuls diluted with water, and given according to circumstances; of the mixture of French brandy, the dose is from one to two fluid ounces.

VINUM XERICUM. Sherry. A Spanish Wine.

Prop. & Comp. The physical properties of sherry are well known; it contains about 17 per cent. of alcohol, together with colouring matter, œnanthic ether, and other ethereal compounds, which impart to it the peculiar bouquet; also certain salts, as acid tartrate of potassium, malates, and sugar.

Off. Prep. It is used in making most of the wines of the Pharmacopœia, as Vinum Aloes, Vinum Antimoniale, Vinum Colchici, Vinum Ferri, Vinum Ipecacuanhæ, Vinum Opii, and Vinum Rhei. Cape and other white wines are often substituted for sherry.

Therapeutics. Sherry may be given as a medicine in the same cases as brandy, where it is desirable to keep up the action of the circulatory system; as a stimulant in dyspepsia, however, it is often inferior to brandy, from its tendency to become acid. The *wines* of the Pharmacopœia are sometimes objectionable when large doses are required, on account of the alcohol they contain; the same remark applies to the administration of tinctures.

VINUM AURANTII. Orange Wine.

Wine made in Britain by the fermentation of a saccharine solution to which the fresh peel of the bitter orange has been added.

Prop. & Comp. A vinous liquid, having a golden sherry colour, and a taste and aroma derived from the bitter orange peel. It contains 10 to 12 per cent. of alcohol, and is but slightly acid to test paper.

Used in the preparation of vinum ferri citratris and vinum quininæ.

CEREVISIÆ FERMENTUM. Beer Yeast. The ferment obtained in brewing beer, and produced by Saccharomyces (Torula) cerevisiæ.

Prop. & Comp. Yeast is a yellowish or greyish-white, viscid, frothy liquid, having a characteristic odour and a peculiar bitter taste; under the microscope it is found to consist, for the most part, of separate oval confervoid cells or short-branched filaments composed of united cells. In composition yeast resembles gluten or albumen, but it is in an active condition, and possesses the property of exciting vinous fermentation in saccharine solutions.

Off. Prep. **Cataplasma Fermenti.** *Yeast Poultice.* (Beer yeast, six fluid ounces; flour, fourteen ounces; water heated to 100° F. (37°·8 C.), six fluid ounces. Mix the yeast with the water, and stir in the flour. Place near the fire until it rises.)

Therapeutics. Yeast, when externally applied, acts as a stimulant and antiseptic, and in the form of cataplasm or poultice is employed to correct the discharges of indolent ulcers. Internally it has been used in low states of the system, in which it is stated to clean the tongue and correct the fœtor of the alvine discharges, to prevent the formation of boils and carbuncles, and as a remedy in diabetes: in the latter disease there has been no proof afforded of its efficacy, and the author has repeatedly given it in cases of boils without benefit; still there are many cases recorded in which its administration appears to have proved of service. Enemata of yeast have been found useful in cases of flatulent distension.

Dose. ½ oz. to 1 oz. Fresh yeast should be employed.

ÆTHER. Ether. A volatile liquid, prepared from alcohol, and containing not less than 92 per cent., by volume, of pure ether $(C_2H_5)_2O$.

Synonym. Æther Sulphuricus.

Prep. Ether is prepared by the action of ten fluid ounces of sulphuric acid upon fifty fluid ounces of rectified spirit, added in successive portions.

The exact nature of the changes which occur during etherification is a subject which will be found discussed at some length in books on chemistry; the following remarks will perhaps suffice to give some idea of the process.

When alcohol and strong sulphuric acid are heated together, at about a temperature of 300° F. (171°·2 C.), sulphovinic acid is first formed, thus: $H_2SO_4 + C_2H_6O = C_2H_6SO_4 + H_2O$, and this is again decomposed with the formation of sulphuric acid and ether, thus: $C_2H_6SO_4 + C_2H_6O = H_2SO_4 + (C_2H_5)_2O$: the latter distils over and is condensed; by the addition of more alcohol, sulphovinic acid is again formed, and again decomposed; and by a continuous and slow supply of alcohol, the formation of the ether is rendered continuous.

Ether is purified by allowing it to stand upon chloride of calcium and slaked lime, and redistilling until it becomes of sp. gr. 0·735.

Prop. Ether is a very volatile, colourless liquid, with a peculiar fragrant odour and hot taste; sp. gr. 0·735; is entirely dissipated in vapour when exposed to the air, and has scarcely any acid reaction; very inflammable, burning with a white flame; it boils below 105° F. (40°·5 C.). A little poured upon the hand evaporates rapidly, producing a sensation of cold. 50 measures agitated with an equal volume of water are reduced to 45 by an absorption of 10 per cent.

Off. Prep. **Æther Purus.** *Pure Ether. Ether* $(C_2H_5)_2O$, *free from Alcohol and Water.* (Ether is purified by well washing it with water, decanting the washed ether, digesting it for twenty-four hours with recently burned lime and chloride of calcium, and then distilling it from this mixture with a gentle heat.) Sp. gr. 0·720.

Spiritus Ætheris. *Spirit of Ether.* (Ether, ten fluid ounces; rectified spirit, twenty fluid ounces. Mix.) Sp. gr. 0·809.

Spiritus Ætheris Compositus. *Compound Spirit of Ether. Hoffmann's Anodyne.* (Gradually mix thirty-six fluid ounces of sulphuric acid with forty fluid ounces of rectified spirit, and let the mixture stand for twenty-four hours. Then distil until the fluid in the retort begins to blacken. Shake the distillate with lime water to neutralise any acid, and remove the supernatant liquor and expose it to the air for about twelve hours. Pour three fluid drachms of the resulting liquid into a mixture of eight fluid ounces of ether, and sixteen fluid ounces of rectified spirit.) In this process "oil of wine" or "ethereal oil" is formed by the action of the sulphuric acid upon the rectified spirit. It is believed to be a mixture of ethylic sulphate $(C_2H_5)_2SO_4$ with several oily hydrocarbons.

Use. Ether is made use of in the Pharmacopœia for making collodion. Pure ether is used as a solvent in the preparation of some alkaloids, in the estimation of quinine in cinchona bark, and to test the purity of some medicinal substances. Spirit of ether is employed in making the ethereal tincture of lobelia.

Therapeutics. Taken internally, ether is a powerful diffusible stimulant, more rapid and evanescent in its action than alcohol; it is used to expel flatus from the stomach, and allay pain and cramp in that organ, to diminish spasm in various other affections, as in spasmodic asthma, angina pectoris, and hysteria. It stimulates the salivary and pancreatic secretions, and thereby assists the digestion of fatty matters; it is sometimes given in combination with cod-liver oil, when the patient finds it difficult to assimilate the latter medicine. When applied externally, it produces cold by its rapid evaporation, and is occasionally made use of as a refrigerant, in the reduction of hernia; if the vapour is confined, rubefacient effects are produced. Inhaled in the form of vapour it acts as an anæsthetic. It is almost universally preferred to chloroform in America; and its use in this country has become very general during the last few years. The chief advantage of ether over chloroform is its greater safety. Ether stimulates instead of depressing the heart; hence there is less danger of cardiac syncope from its use. Moreover, vomiting is said to be less frequent and troublesome after ether than after chloroform. Against these advantages, the following drawbacks have to be placed:—

1. Ether causes laryngeal spasm, violent struggling, and great lividity at the outset of its administration.

2. Its nauseous odour and taste render it very disagreeable to the patient.

3. The recovery of consciousness is often followed by great excitement, which may last for hours. Hence it has been found unsuitable for administration in operations for cataract. Fatal accidents have occurred during this period of excitement from patients tearing off their bandages, &c. Accordingly, they should be kept under observation for some time after anæsthesia has passed off.

4. The large quantity of ether required makes its use far more expensive than that of chloroform.

5. The inflammable character of its vapour forbids its employment by artificial light, or in cases requiring the actual cautery.

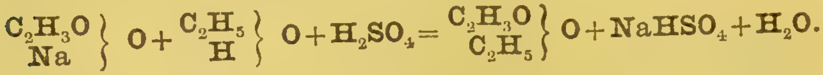
We may conclude, therefore, that chloroform, setting aside its dangerous effect upon the heart, is preferable to ether as an anæsthetic. It has been found in practice that chloroform is least likely to cause dangerous symptoms in infants, in old people, and in women during child-birth. For long operations upon adults, especially when the heart's action is feeble, ether is the more suitable anæsthetic of the two.

Ether is most conveniently administered on a hollow, conical sponge, coated with waterproof material. The cone should be closely applied to the face so as to admit as little air as possible. An ounce of ether should be poured on the sponge to begin with; if great lividity and stertor occur, the sponge should be removed; a few inspirations will restore the normal colour to the face. The average quantity required to produce anæsthesia in an adult is $2\frac{1}{4}$ oz. In protracted operations, the ether employed has been measured by pounds.

Dose. Of ether, 20 min. to 1 fl. drm.; of spirit of ether, $\frac{1}{2}$ fl. drm. to $1\frac{1}{2}$ fl. drm.; of compound spirit of ether, $\frac{1}{2}$ fl. drm. to 2 fl. drm.; the oil of wine contained in this preparation is thought by some to impart an anodyne property to it.

ÆTHER ACETICUS. Acetic Ether. (Ethyl Acetate.) $C_2H_5,C_2H_3O_2$.

Prep. By distilling a mixture of forty ounces of dry acetate of sodium, thirty-two fluid ounces and a quarter of rectified spirit, and the same amount of sulphuric acid. The distilled product is added to six ounces of freshly dried carbonate of potassium in a stoppered bottle; they are allowed to remain together for twenty-four hours, and the ethereal liquid is then decanted and rectified. The process may be represented as follows :



$$\left.\begin{matrix}C_2H_3O\\Na\end{matrix}\right\}O+\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}O+H_2SO_4=\left.\begin{matrix}C_2H_3O\\C_2H_5\end{matrix}\right\}O+NaHSO_4+H_2O.$$

Prop. A clear liquid with a burning taste and an agreeable odour, faintly resembling that of apples. Sp. gr. about 0·900. Boiling-point, 166° F. (74°·4 C.). Soluble in all proportions in rectified spirit and ether. One part dissolves in about 10 parts of water at 60° F. (15°·5 C.). It is a good solvent for the essential oils, resins, and for pyroxylin. When mixed with a solution of caustic potash in alcohol, it is immediately decomposed into acetate of potassium and alcohol.

Therapeutics. Possesses the stimulant and anti-spasmodic properties of ether, only in a feebler degree. On the other hand, its taste and smell are more agreeable. It is not used as an anæsthetic. It is employed in the preparation of liquor epispasticus.

Dose. 20 min. to 60 min.

SPIRITUS ÆTHERIS NITROSI. Spirit of Nitrous Ether. A spirituous solution, containing nitrous compounds, aldehyd and other substances.

Synonym. Spiritus Etheris Nitrici.

Prep. Nitric acid, three fluid ounces; sulphuric acid, two fluid ounces; fine copper wire, two ounces; rectified spirit, a sufficiency. Add the sulphuric acid gradually to a pint of the spirit, then, in the same way, add two and a half fluid ounces of the nitric acid; and distil in a vessel containing the copper, commencing at 170° F. (76°·7 C.), and not exceeding 180° F. (82°·2 C.), until twelve fluid ounces have passed over; withdraw the heat and let the contents of the retort cool: add the remaining half ounce of nitric acid and redistil until the distillate has increased to fourteen fluid ounces. Mix this with two pints of rectified spirit, or as much as will make the product answer to the specific gravity and nitric oxide test alluded to below.

In this process the sulphuric acid decomposes the alcohol with formation of ether, which is converted into nitrous ether by the nitrous acid generated by the action of the copper on the nitric acid.

Prop. A colourless or slightly yellow liquid, with an agreeable fruity odour, and slightly acidulous cooling taste; volatile and inflammable; sp. gr. 0·840 to 0·845; it has usually a slight acid reaction, but should effervesce feebly or not at all when bicarbonate of sodium is added; when agitated with the solution of sulphate of iron, and a few drops of sulphuric acid, it becomes deep olive brown or black (from the liberation of the peroxide of nitrogen).

When freshly prepared and tested as described in the Pharmaceutical Journal, 3rd series, vol. xiii., p. 63; or vol. xv., p. 101; or vol. xv., p. 673, it should yield, at the ordinary temperature and pressure, seven times its volume of nitric oxide gas; even after it has been kept some time, and the vessel containing it has occasionally been opened, it should yield not much less than five times its volume of the gas.

Therapeutics. Spirit of nitrous ether is a stimulant diaphoretic, and diuretic, used for the latter property in dropsies; also as a diaphoretic in slight febrile affections: it also appears to act as a grateful refrigerant. Experiments on a healthy individual showed that it slightly increases the urinary water, while diminishing the total amount of urea and solids. It is popularly known by the name of Sweet Spirits of Nitre. This preparation, even when properly made, contains but a small amount of nitrite of ethyl, and has usually been sold almost devoid of this compound: so that the true value of real nitrous ether can scarcely be said to have been clinically determined.

Dose. ½ fl. drm. to 2 fl. drm.

Adulteration. Excess of acid, from being too long kept or improperly prepared; it then effervesces with carbonate of sodium. It is incompatible with iodide of potassium, liberating iodine unless carbonate of potassium be present.

CHLOROFORMUM. Chloroform. **$CHCl_3$.**

Prep. Chlorinated lime, ten pounds; rectified spirit, thirty fluid ounces; water, three gallons; chloride of calcium, broken into fragments, two ounces; slaked lime, a sufficiency; sulphuric acid, a sufficiency; distilled water, nine fluid ounces; ethylic alcohol, a sufficiency. The rectified spirit and water are distilled with a mixture of slaked and chlorinated lime; the distillate well agitated with water, and the lower stratum, which is crude chloroform, separated, repeatedly washed with successive portions of water, and well shaken with its own volume of sulphuric acid; the layer of chloroform is again separated, mixed with chloride of calcium and slaked lime, and purified by redistillation. One per cent., by weight, of ethylic alcohol is subsequently added. Chloroform may be produced by several processes, but the above probably yields it purer and more advantageously than any other. When chlorine, from chlorinated lime, acts upon alcohol, many complicated and ill-understood decompositions ensue; the principal product, however, seems to be chloroform.

$$3C_2H_5HO + 8CaCl_2O_2 = 2CHCl_3 + 3CaCO_3 + CO_2 + 8H_2O + 5CaCl_2.$$

Prop. Chloroform is a colourless heavy liquid, with a peculiarly agreeable, fruity, ethereal odour, and sweet taste; sp. gr. 1·497; boiling-point, 140° F. (60° C.); but slightly soluble in water, sinking readily in that fluid; it mixes with alcohol and ether in all proportions; neutral in reaction; when rubbed on the skin it quickly evaporates, and, if pure, leaves no odour. Chloroform is a powerful solvent of caoutchouc, gutta percha, many resins, fats and alkaloids, also of iodine and bromine. When exposed to air and light, it is apt to decompose, hydrochloric acid and free chlorine being formed: it is stated that when chloroform is purified with oil of vitriol, it is more liable to undergo this change, and that redistillation with carbonate of barium gives it stability. Chloroform is not coloured by agitation with sulphuric acid, and evolves no gas when potassium is dropped into it, indicating the absence of oily matters or any oxygen compounds. Chloroform is decomposed by fixed alkalies; by an alcoholic solution of potash it is resolved into formiate of potassium and chloride of potassium.

$$CHCl_3 + 4KHO = KHCO_2 + 3KCl + 2H_2O.$$

Off. Prep. **Aqua Chloroformi.** *Chloroform Water.* (One fluid drachm of chloroform dissolved by agitation with twenty-five fluid ounces of distilled water.)

Linimentum Chloroformi. *Liniment of Chloroform.* (Chloroform, two fluid ounces; liniment of camphor, two fluid ounces.)

Spiritus Chloroformi. *Spirit of Chloroform.* (Chloroform, one fluid ounce; rectified spirit, nineteen fluid ounces.) Sp. gr. 0·871.

Tinctura Chloroformi Composita. *Compound Tincture of Chloroform.* (Chloroform, two fluid ounces; rectified spirit, eight fluid ounces; compound tincture of cardamoms, ten fluid ounces. Mix.)

Tinctura Chloroformi et Morphinæ. *Tincture of Chloroform and Morphine.* (Chloroform, one fluid ounce; ether, two fluid drachms; rectified spirit, one fluid ounce; hydrochlorate of morphine, eight grains; dilute hydrocyanic acid, half a fluid ounce; oil of peppermint, four minims; liquid extract of liquorice, one fluid ounce; treacle, one fluid ounce; syrup, a sufficiency to form eight fluid ounces.) Contains in a 10 minim dose, $1\frac{1}{4}$ min. of chloroform, and $\frac{1}{48}$ gr. of hydrochlorate of morphine.

Therapeutics. When taken *internally,* chloroform appears to act as a narcotic and antispasmodic, not unlike ether; its sedative effects, however, are more distinctly marked, and it produces in large doses a general diminution of sensorial power, with drowsiness, and without exhilaration or acceleration of the pulse. It has been employed in spasmodic affections, as spasmodic coughs, asthma, cholera, lead colic, and hysteria; it is also stated to act as a valuable sedative in cancer, neuralgia, and other painful affections, and it is even asserted to be antiperiodic, relieving sometimes when bark and quinine have failed.

Externally, it has been used in medicine to allay pain and irritation in neuralgia, and certain skin affections attended with troublesome itching; also as a stimulant and rubefacient. For all these purposes, however, its application is very limited; its chief employment being in the form of vapour, for the production of its anæsthetic effects.

When *inhaled* in small doses, it produces a slight species of inebriation, with some impairment of vision and common sensibility, consciousness remaining. The sensations produced by these small doses are usually of a pleasurable character; carried to this extent, it may be employed in the treatment of spasmodic and neuralgic affections.

If the inhalation be continued longer, the patient passes into a dreamy state, sometimes with considerable mental excitement, but with loss of common sensibility; it may be given to this extent when employed in natural labour: from these effects the patient soon recovers on the cessation of the administration of the vapour.

If the inhalation be carried still further, the patient loses the power of voluntary motion; there is an inclination of the eyes upwards, complete suspension of the mental faculties, with slight contraction of the muscles and rigidity of the limbs. This is often so slight as to escape observation; but in strong young men it sometimes amounts to tetanic spasm, especially if the chloroform is inhaled after alcoholic stimulus has been taken; it also occurs very frequently in cases when patients from the dread of taking the chloroform resist breathing. Although at this stage common sensibility appears quite destroyed, yet on the performance of surgical operations there may be indications in the features expressive of pain, and even moaning and inarticulate cries. The proper period for the performance of surgical operations is when this condition has been kept up for some time, and the winking of the eyelids very much diminished.

If the effects be carried further, complete relaxation of the voluntary muscles takes place, but the sphincters remain contracted, the respiration goes on, though accompanied with slight stertorous breathing, the glottis continues sensible, the sensibility of the pharynx is somewhat impaired, but it is sufficient to allow the swallowing of the blood collected there in operations about the mouth, unless the bleeding is very profuse. In dental operations the patient often vomits blood before consciousness is restored. The iris at this stage is less sensitive to light, and moderately contracted. The time for reduction of hernia and dislocations is when this relaxation of the muscles has fully taken place.

Chloroform has been administered in the form of vapour in the treatment of tetanus, epileptiform convulsions, hydrophobia, colic, and painful spasmodic affections, as during the passage of renal calculi, or of gall-stones, &c.; in some of these cases its use has been followed by great relief. The first and second set of symptoms above mentioned may be generally produced by administering from half a fluid drachm to a fluid drachm, and repeating it in a few minutes if this condition is required to be kept up. When the inhalation is suspended, the patient, in the course of five or six minutes, recovers his consciousness, but without remembering anything which has taken place. For the production of complete insensibility and relaxation more chloroform must be employed, and the effects carefully watched. At this stage the jaw may drop and the tongue fall back so as to allow the epiglottis to cover the larynx. In this case it is a common practice to open the mouth and take hold of the tongue and draw it forward with a pair of artery forceps. An equally effective and less objectionable plan is to raise the chin and draw it forcibly away from the spine.

If the inhalation has proceeded too far, the dangerous symptoms may be those of syncope, or of apnœa—the breathing becoming more stertorous and intermittent; or both sets of symptoms may appear at the same time. Artificial respiration is the best remedy in any case, and may be relied on to recover the patient if commenced while the pulse is still perceptible. It is often successful even when the heart's action is too feeble to make a pulse at the wrist.

There is reason to believe that cardiac syncope of a fatal character has been produced by inhaling air very strongly charged with chloroform. Indeed, it is owing to the risk of cardiac paralysis, that ether has taken the place of chloroform to so great an extent during the last two or three years. It is therefore important to administer chloroform gradually; and if a handkerchief is used, to hold it at least an inch from the mouth, and not to put more than 15 or 20 minims upon it at one time. The pulse, as well as the respiration, should be constantly watched.

In order to regulate with precision the proportion of air and chloroform, Mr. Clover invented an instrument by which the patient is made to inhale under four per cent. of the vapour of chloroform, or any weaker mixture that may be desired.

In the administration of chloroform, several precautions should be taken. In the first place, the chloroform should be pure, that is, free from oily matter, hydrochloric acid, and uncombined chlorine ; it should not be used at all, or if so, employed with the greatest care, for persons suffering from any cerebral disease, or tendency to such, or any organic cardiac affection. And care should be taken that the patient breathes atmospheric air at the same time with the chloroform vapour. Disagreeable symptoms sometimes occur after the inhalation of chloroform, as nausea, vomiting, headache : probably these may occasionally arise from impurities in the preparation. The patient should fast for four or five hours before chloroform is exhibited, and some diffusible stimulant such as wine or brandy should always be given just before the anæsthetic. It has been found advisable to inject a preliminary dose of morphia under the skin of such persons as are liable to suffer from violent excitement during the first stage of anæsthesia ; the full effect of the chloroform is thus more speedily and tranquilly induced, the state of unconsciousness is more profound and lasting, and a much smaller quantity of the anæsthetic is found to suffice.

A mixture of chloroform and ether in varying proportions is now very often employed as an anæsthetic. A mixture approved by the Medico-Chirurgical Society is known by the initials A. C. E., and consists of alcohol (sp. gr. 0·838), one volume ; chloroform (sp. gr. 1·497), two volumes ; and ether (sp. gr. 0·735), three volumes. It is recommended as being safer than chloroform in long operations, but it takes a greater length of time to produce anæsthesia.

When chloroform is taken into the stomach, or exhibited in the form of vapour, it is absorbed into the blood, and Dr. Snow discovered its presence in the blood of animals killed by this agent. Its detection can be effected by causing the vapour from the suspected fluid to pass through a red-hot tube, when the chloroform, if present, is decomposed and free chlorine evolved, which may be made to act upon nitrate of silver, or upon starch-paper impregnated with iodide of potassium.

Dose. Chloroform, when given in a liquid state, may be rubbed up with yolk of egg and mucilage, or syrup: the dose may be from 1 min. to 10 min. Of aqua chloroformi ½ fluid oz. to 2 fl. oz. It is more frequently administered in the form of spiritus chloriformi (chloric ether), of which the dose is from 10 min. to 60 min.; or of compound tincture of chloroform from 20 min. to 60 min. The dose of the tincture of chloroform and morphine is from 5 min. to 10 min. Externally it may be employed in the form of the chloroform liniment, or added to other liniments, or as an ointment, made by rubbing together 1 part of chloroform with about 7 of lard. The doses of chloroform for inhalation have been already indicated.

Adulteration. Hydrochloric acid and free chlorine, detected by their acid reaction and bleaching power, and by the water with which the chloroform has been agitated, precipitating nitrate of silver. Sometimes an oily matter, formed during the preparation, may be present, detected by its leaving an odour on evaporation, and being coloured by sulphuric acid.

IODOFORMUM. Iodoform. CHI_3.

Prep. Iodoform results from the action of iodine on a mixture of alcohol and solution of carbonate of potassium.

Prop. Shining lemon-yellow, crystalline scales, with a persistent disagreeable odour and flavour. Very slightly soluble in cold water, more soluble in rectified spirit, soluble in chloroform or ether; readily and entirely soluble in warm ether. When heated it melts to a brown liquid, gives off brown and violet vapours, and leaves a black residue which entirely disappears on continued ignition. When warmed with an alcoholic solution of potash and acidified with nitric acid, iodine is liberated, the mixture acquiring a brown colour, and, when cold, giving a blue colour on the addition of starch solution.

Off. Prep. **Suppositoria Iodoformi.** *Iodoform Suppositories.* (Iodoform, thirty-six grains; oil of theobroma, one hundred and forty-four grains. Divided into twelve suppositories.) Each suppository contains three grains of iodoform.

Unguentum Iodoformi. *Ointment of Iodoform.* (Iodoform, one ounce; benzoated lard, nine ounces.)

Therapeutics. Iodoform is a powerful antiseptic and deodoriser. In substance or strong solution it is a local anæsthetic. After absorption it is said to produce sleeplessness, headache, and loss of memory. On account of its local anæsthetic and antiseptic properties it is used in operations on the bladder or rectum; in chancres and syphilitic sores; also to relieve the pain of cancer. It has been used as vapour in phthisis, and has also been given internally.

Dose. $\frac{1}{2}$ gr. to 3 gr.

TETRACHLORIDE OF CARBON. CCl_4. (Not Official.)

Prep. Prepared by the action of chlorine on carbon disulphide.

Prop. A transparent colourless oil, with pungent odour, not unpleasant when quite free from the disulphide. Sp. gr. 1·56. Boiling point, 170° F. (76°·66 C.). Density of vapour, 5·3.

Therapeutics. When inhaled it produces symptoms similar to those due to chloroform. It was at one time supposed to excite less vomiting, but experience has not confirmed this.

It was also thought to be safer than chloroform on account of its higher boiling-point and consequent less rapid vaporisation. Whatever advantage there may be in this respect, it is more than counterbalanced by the greater difficulty of expelling it from the system in case an overdose should accidentally be taken.

BICHLORIDE OF METHYLENE. CH_2Cl_2. (Not Official.)

Prep. By acting on chloroform with nascent hydrogen.

Prop. A colourless volatile liquid, with a smell like chloroform. Sp. gr. 1·34. Boiling point 104° F. (40° C.). When dropped into water about one fourth of it is dissolved.

Therapeutics. It has been recommended by Dr. Richardson as a safer anæsthetic than chloroform, and it is said to produce less sickness and discomfort, and to be more agreeable to inhale. Its action is more rapid, but a larger quantity is required.

ALCOHOL AMYLICUM. Amylic Alcohol. Fousel Oil.

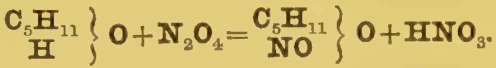
Amylic Alcohol, $C_5H_{11}HO$, with a small proportion of other spirituous substances. An oily liquid, contained in the crude spirit produced by the fermentation of saccharine solutions with yeast, and separated in the rectification or distillation of such crude spirit. It should be redistilled, and the product passing over at 253° to 260° F. (122°·8 to 126°·7 C.) should alone be collected for use.

Prop. A colourless liquid, much less volatile than ordinary alcohol, which therefore accumulates in the last portion of the liquids submitted to distillation. Sp. gr. 0·818, and with a peculiar unpleasant odour and burning taste. It is sparingly soluble in water, but soluble in alcohol, ether and essential oils. By the action of oxidising agents it is converted into *Valerianic Acid*, which corresponds to acetic acid in the ethyl series.

It is introduced into the Pharmacopœia for the preparation of Valerianate of Soda and of Nitrite of Amyl.

AMYL NITRIS. Nitrite of Amyl. The preparation consists chiefly of Nitrite of Amyl. $\mathbf{C_5H_{11}NO_2}$.

Prep. By passing nitrous or nitric vapours into amylic alcohol contained in a heated retort; the distillate is washed with caustic soda to remove hydrocyanic and other acids; the moisture removed by potassium carbonate, and the nitrite purified by fractional distillation. The reaction may be thus represented:



$$\left.\begin{array}{l}C_5H_{11}\\H\end{array}\right\}O+N_2O_4=\left.\begin{array}{l}C_5H_{11}\\NO\end{array}\right\}O+HNO_3.$$

Prop. An ethereal liquid of a yellowish colour and peculiar odour. Sp. gr. ·880. On distillation about 70 per cent. passes over at 194° to 212° F. (90° to 100° C.). Insoluble in water, but freely soluble in rectified spirit, in all proportions. If it be added drop by drop to fused caustic potash, valerianate of potassium will be formed.

Therapeutics. Nitrite of amyl vapour, when inhaled, causes a great and rapid fall of blood-pressure, with accelerated action of the heart. This diminution of blood-pressure is due to dilatation, first of the systemic, next of the pulmonary arterioles. If inhalation is stopped, the blood-pressure speedily returns to the normal. If it is continued, suffocative convulsions and death ensue. The dilatation of the arterioles is probably due to a direct action of the nitrite upon them, and not to any influence exerted on the vaso-motor centres. Several hours after the administration of the vapour, the urine is found to contain sugar; this transient diabetes being probably due to dilatation of the hepatic vessels. The nitrite does not affect the motor or sensory nerves till just before death. Its suffocative action may perhaps be explained by the fact that it prevents the hæmoglobin of the red corpuscles from imparting its oxygen to the tissues. It has been found to lower the heat of the body and to diminish the amount of carbonic acid excreted. (Brunton and others.)

From two to eight minims of the nitrite inhaled by a healthy man quickens the pulse-rate in from three to ten seconds; this is followed by flushing of the face, and redness of ears, with throbbing of the carotids and a sense of oppression in the chest. Slight headache and general lassitude remain after the primary effects have subsided.

Nitrite of amyl has been inhaled in cases of angina pectoris; it gives instantaneous relief in the purely neurotic form, unattended by disease of the heart or great vessels (Anstie); in a case due to aortic disease with hypertrophy, the vapour relieved the paroxysms at once and permanently (Brunton). It has been employed in spasmodic asthma and several forms of neuralgia with good effect. Its value in epilepsy is questionable; indeed, it is said to have caused epileptiform convulsions when used hypodermically. It has been tried in the collapse of cholera, but without any satisfactory result.

Although it causes a feeling of fulness in the head, little danger of apoplexy is to be apprehended from it, because the blood-pressure, instead of being higher is much lower than usual, and therefore the tendency of the vessel to burst must be reduced to its minimum (Brunton).

Dose. By inhalation, 2 to 5 min. on a piece of lint. Internally, ½ min. to 1 min. may be given, dissolved in rectified spirit.

NITROGLYCERINUM. Nitroglycerine. *Syn.* Glonoine. $\mathbf{C_3H_5(NO_3)_3}$. (Not official, but yielding an official preparation.)

Prep. By dropping pure glycerine into a mixture of sulphuric and nitric acid kept cool by iced water; pouring the mixture into a large quantity of cold water, well washing the nitroglycerine which separates, and carefully drying it in a warm room.

Prop. A colourless transparent liquid, with sweet aromatic taste, and no odour. Slightly volatile; sparingly soluble in water, freely soluble in absolute alcohol and in ether, also in oils and fats. It is liable to explode spontaneously if not perfectly pure; in fatty or oily solution it is perfectly safe.

Off. Prep. **Tabellæ Nitroglycerini.** *Tablets of Nitroglycerine.* (Tablets of chocolate, each weighing two and a half grains, and containing one-hundredth of a grain of pure nitroglycerine.)

Therapeutics. The action of nitroglycerine resembles that of nitrite of amyl and of other nitrites, but is more persistent. This is probably because the whole of it is absorbed without decomposition, and nitrous acid, being set free in the blood in a nascent condition, is more active than it would otherwise be (Brunton).

It is useful in angina pectoris, headache, neuralgia, &c. It frequently relieves sea-sickness. It is useful in lessening arterial tension when the heart is weak in old persons, or from fatty degeneration, and in some cases of Bright's disease.

Dose. 1 or 2 tablets.

CHLORAL HYDRAS. Hydrate of Chloral. C_2HCl_3O,H_2O.

Prep. Chloral may be obtained by passing dry chlorine gas through absolute alcohol to saturation; hydrochloric acid is abundantly liberated, and chloral formed in solution. The decomposition may be thus represented:

$$C_2H_6O+4Cl_2=5HCl+C_2HCl_3O.$$

It can be obtained in the pure state by distillation from sulphuric acid, and then from quick lime. It is converted into the hydrate by the addition of water.

Prop. Hydrate of chloral occurs as colourless crystals, much like those of Epsom Salts, which do not deliquesce on exposure to the air. It has a pungent, but not acrid odour, and a pungent, rather bitter taste. On the application of a gentle heat it fuses to a colourless, transparent liquid, which, as it cools, begins to solidify at about 120° F. (48°·9 C.). It boils in a test-tube, with pieces of broken glass immersed in it, at from 202° to 206° F. (94°·4 to 96°·7 C.), and at a slightly higher temperature it volatilises on platinum foil without residue. Soluble in less than its own weight of distilled water, rectified spirit, or ether, and in four times its weight of chloroform. The aqueous solution should be neutral or but slightly acid to test-paper (showing freedom from hydrochloric acid). A solution in chloroform when shaken up with sulphuric acid, does not impart colour to the acid. (Absence of oily impurities.) 100 grains of hydrate of chloral dissolved in an ounce of distilled water and mixed with 30 grains of slaked lime, should yield when carefully distilled not less than 70 grains of chloroform. [Hydrate of chloral is decomposed by alkalies into chloroform and a formiate of the base:

$$2(C_2HCl_3O.H_2O)+CaH_2O_2=CaC_2H_2O_4+2CHCl_3+2H_2O.]$$

Off. Prep. **Syrupus Chloral.** *Syrup of Chloral.* (Hydrate of chloral, eighty grains; distilled water, one fluid drachm and a half; simple syrup, enough to make one fluid ounce.) Ten grains of hydrate of chloral are contained in each fluid drachm of the syrup.

Therapeutics. It was observed by Oscar Liebreich that chloral hydrate is decomposed by alkaline solutions into chloroform and a formiate of the base; the likelihood of a similar decomposition being wrought in the blood and causing the physiological effects of chloroform, led him to administer it as a medicine. It was thus introduced as an anæsthetic; but experience showed that it was not nearly so certain or so safe as chloroform in vapour, the dose having to be large, and different for different individuals. Subsequent experiments, more particularly those of Hammersten, have also shown that the hypothesis of the liberation of chloroform is untenable.

Injected into the veins of a rabbit, chloral causes deep sleep, and complete muscular relaxation. It lowers the blood-pressure, causes dilatation of the cutaneous arterioles, and markedly lessens the heat of the body. The respiratory movements are rendered slower, owing probably to the action of the drug on the respiratory centre in the medulla oblongata. Finally, the heart's action is depressed, probably through paralysis of its intrinsic motor ganglia. The reflex excitability of the cord is diminished, and at last abolished; the peripheral motor nerves are not paralysed. The cerebral functions also are impaired. Death may result from cardiac syncope; Liebreich asserts that—as in the case of chloroform—this fatal issue is not hindered by artificial respiration.

The following are the chief medicinal uses of the drug:—

1. It has the power of inducing natural sleep. In the healthy subject, a dose of 30 grains is followed in from half to three-quarters of an hour by a light and normal sleep, without previous cerebral disturbance, and without causing the headache, nausea, and constipation, which commonly result from the administration of opium. In this dose it does not seem to affect either the respiration or the pulse.

2. As an anodyne, chloral stands far below opium or morphine. In doses of 15 grains, repeated if necessary in twenty minutes, it has been recommended by Dr. Playfair to lessen pain in labour before the os uteri has become completely dilated. Speaking generally it relieves pain in certain cases, but its operation is very capricious. As a rule, it seems merely to allay the pain so long as sleep continues, the pain returning when the patient wakes. It hardly ever relieves pain unless by causing sleep.

3. It is employed to quiet the agitation of delirium tremens, acute mania, and severe chorea. In such cases it is of great value.

4. It is used to relax muscular spasm in tetanus and strychnine-poisoning. It effects this purpose with great uniformity; numerous cases have recovered under its use, and when it fails to cure, it certainly palliates.

5. It is of great value as a hypnotic in cases where opium is inadmissible; *e.g.*, in uræmic patients, young children, and certain stages of continued fever.

6. It checks the nocturnal restlessness and sweating of phthisis without disturbing the nutritive processes.

7. It gives relief in some cases of asthma and pertussis.

A full dose of chloral occasionally gives rise to dangerous symptoms of cardiac depression. Giddiness and sickness, delirium, a weak and irregular pulse, pallor, coldness of the extremities, lividity, are the symptoms which may be followed by syncope and death. When the drug fails to cause sleep, it may produce considerable excitement. It is sometimes followed by an eruption of urticaria. It should be given with caution to patients with disease of the heart and arteries, or to such as have their bronchi loaded with secretion. Although the habitual use of chloral is less hurtful to the nutritive functions than that of opium, yet it is sometimes attended with evil consequences; profound melancholy and enfeeblement of the will, muscular lassitude, inability to sleep without the drug, being among them.

Chloral is an antidote to strychnine, physostigmine and picrotoxine.

Chloral hydrate should not be given hypodermically; it irritates the skin too much. Its nauseous taste may be disguised by syrup of orange-peel or syrup of tolu.

Dose. 5 gr. to 30 gr. or more. Of the syrup, ½ fl. drm. to 2 fl. drm. or more.

BUTYL-CHLORAL HYDRAS. Hydrate of Butyl-Chloral. $C_4H_5Cl_3O,H_2O$. Croton-Chloral Hydrate, wrongly so called.

Prep. Produced by the action of dry chlorine gas on aldehyd cooled to a temperature of 14° F. (– 10° C.), separated by fractional distillation, and converted into the solid hydrate by the addition of water.

Prop. In pearly white crystalline scales, having a pungent odour, resembling that of chloral hydrate, and an acrid nauseous taste. It fuses at about 172° F. (77°·8 C.) to a transparent liquid.

Soluble in about fifty parts of water, in its own weight of rectified spirit and of glycerine, and nearly insoluble in chloroform. The aqueous solution is neutral, or but slightly acid. Unlike chloral hydrate, it does not yield chloroform when heated with solutions of potash, soda, or milk of lime.

Therapeutics. The action is similar to that of chloral hydrate, but less powerful, and it exerts a less depressing effect upon the heart. Hence it is indicated in cases where chloral hydrate is inadmissible, owing to disease of the heart. It is said by Liebreich to affect the fifth nerve especially, and to cause anæsthesia in the parts supplied by it before general anæthesia is produced. It has been given with good effect in various forms of trigeminal neuralgia, and has been added to chloral hydrate when very large doses of the latter drug are needed to produce sleep.

Dose. 1 gr. to 5 gr. to relieve pain; 5 gr. to 15 gr. to procure sleep; the taste being covered by syrup of tolu, &c.

NITROUS OXIDE GAS. N_2O. (Not official.)

Prep. By heating nitrate of ammonium at a temperature of 400° F. (204°·44 C.), when the salt breaks up into nitrous oxide and water,

$$NH_4NO_3 = N_2O + 2H_2O.$$

The gas thus prepared is washed by being passed in succession through water, caustic potash and solution of protosulphate of iron, to rid it of mechanical impurities, carbonic acid and the higher oxides of nitrogen respectively. It is generally stored in iron bottles, in the liquid form, which is obtained by great mechanical compression.

Prop. A tasteless, inodorous gas, of sp. gr. 1·527. It is liquefied by a pressure of 50 atmospheres at 45° F. (7°·22 C.), when its sp. gr. is 0·908. Cold water dissolves about its own volume of the gas, which is expelled by boiling the solution. It supports combustion nearly as well as oxygen. It differs from oxygen in not producing red fumes when mixed with nitric oxide.

Therapeutics. The name laughing gas given to this substance originated in Sir H. Davy's observation that when inhaled it caused exhilaration of spirits, but this phenomenon is not exhibited when the gas employed is free from any admixture. When inhaled in the pure state, unmixed with air, it is the most satisfactory anæsthetic that is known. Before administering the gas, the only precaution to be observed is that a meal should not have been recently taken. Vomiting rarely or never occurs, and nausea is not at all common as a direct result.

It is commonly given by means of an inhaler, made with valves, so arranged that any amount of fresh gas may be introduced at the will of the operator. The apparatus covers the mouth and nose. The patient is told to take deep, but not hurried inspirations, when in from 20 to 30 seconds slight lividity of the face appears, which by the end of a minute is very marked; at which time the hands and eyeballs, from being previously quiet, commence twitching, and the pupils are slightly dilated. Without any further administration of the gas, small operations of short duration can be performed, but two or three inspirations will bring back the normal colour to the face. When a longer operation is contemplated, the gas must be administered until slight stertorous breathing is caused, and the anæsthesia may be maintained by removing the apparatus from the face every now and then so as to allow one respiration of air to about 5 or 6 respirations of the gas. If the stertor becomes great, the pulse irregular, and the pupils widely dilated, the administration of the gas should be instantly stopped. If the symptoms become alarming, artificial respiration should be immediately commenced, this generally leads to a rapid recovery if the action of the heart has been regular, it being a known fact, from experiments on animals, that respiration ceases before the heart stops, when an overdose of the gas has been exhibited.

The recovery from the anæsthesia induced by this gas is very rapid, a patient, after having had sufficient for the extraction of a tooth, being able to walk away in five minutes or so, with no unpleasant reminiscences. On the first few inhalations, a ringing noise is heard in the head, with a sensation of general pulsation, followed by a dreamy condition of very short duration, leading to the anæsthesia. Screams and violent movements are not uncommon during the anæsthesia, if it be not carried out to its full extent.

It is not advisable to administer this gas in cases of advanced pulmonary disease, or where there is any tendency to hæmoptysis. Care must be taken, in operations on the mouth, that blood is not allowed to flow into the trachea and cause suffocation.

Nitrous oxide appears to produce its effect by diminishing the amount of oxygen contained in the blood. The gas itself is not in any way changed by being respired. During anæsthesia, the amount of carbonic acid exhaled is said to be diminished by about a half. It has been experimentally determined that the sensibility of the sciatic nerve in the dog disappears only at the moment when the proportion of oxygen in the blood falls below a certain standard.

Owing to the gas undergoing no chemical change in respiration, Mr. Coleman has contrived an apparatus by which, after expiration, the carbonic acid exhaled is absorbed by quicklime and the gas again made fit for inhalation.

HYDROCARBONS.

CREASOTUM. Creasote, or Kreasote. A product of the distillation of Wood Tar.

Prep. During the destructive distillation of wood in the preparation of pyroligneous acid, amongst other hydrocarbons creasote is formed; it is also obtained from oil of tar, or pyroxylic oil, and is contained in the smoke from wood.

Prop. & Comp. A colourless or yellowish transparent liquid, of peculiarly strong odour and burning taste: sp. gr. 1·071; very slightly soluble in water, but soluble in glacial acetic acid, alcohol, and ether; it coagulates albumen, and has considerable preservative powers over both animal and vegetable matter; it should volatilise entirely at 212° F. (100° C.), and not leave a transparent stain on white filtering paper. An aqueous solution (1 per cent.) with a drop of a dilute neutral solution of ferric chloride yields a green coloration, rapidly changing to a reddish-brown, and, unless the mixture is very dilute, giving a reddish-brown precipitate.

Off. Prep. **Mistura Creasoti.** *Creasote Mixture.* (Creasote, fifteen minims; glacial acetic acid, fifteen minims; spirit of juniper, half a fluid drachm; syrup, one fluid ounce; distilled water, fifteen fluid ounces.)

Unguentum Creasoti. *Ointment of Creasote.* (Creasote, one fluid drachm; simple ointment, one ounce. Mix thoroughly.)

Vapor Creasoti. *Inhalation of Creasote.* (Creasote, twelve minims; boiling water, eight fluid ounces. Mix the creasote and water in an apparatus so arranged that air may be made to pass through the solution, and may afterwards be inhaled.)

Therapeutics. Internally, in small doses, creasote acts as a sedative to the stomach, and has often been used with success to arrest certain forms of vomiting, not connected with febrile disturbance of the system; it has also been given with temporary advantage in diabetes; sometimes it is useful in diarrhœa.

Topically it allays toothache depending on caries, and forms a stimulant application to ulcers and chronic skin disorders; it is used also as a styptic in hæmorrhages; and as a gargle in mercurial salivation. The vapour mixed with that from hot water in the form of the official inhalation is useful in checking excessive expectoration in chronic bronchitis, and correcting the fœtor of the sputa in dilatation of the bronchi, and in pulmonary abscess and gangrene.

Dose. 1 min. to 3 min., in pill. Of the creasote mixture, 1 fl. oz. to 2 fl. oz.; as a gargle, ½ drm. of creasote may be used to the pint of water.

Incompatibles. Creasote, when mixed with oxide of silver gives rise to much heat, and even flame, from the oxidising power of the silver compound; hence these two medicinal agents should not be prescribed together.

ACIDUM CARBOLICUM. Carbolic Acid. HC_6H_5O.

Synonyms. Phenic Acid. Phenol.

Prep. An acid obtained from coal-tar oil by fractional distillation and subsequent purification.

Prop. Carbolic acid is met with in separate pulverulent crystals, or in acicular crystalline masses, colourless, or having a very slight reddish or brownish tinge, melting at not lower than 91°·5 F. (33° C.), boiling at not higher than 371° F. (188°·3 C.), to an oily liquid, having a strong odour and taste, resembling those of creasote, but more offensive; it also resembles creasote in many of its characters and properties. Sp. gr. at the melting point 1·060 to 1·066. The crystals readily absorb moisture on exposure to the air, and they are thus liquefied; the acid, however, is but slightly soluble in water, but it is freely soluble in alcohol, ether, benzol, chloroform, disulphide of carbon, glycerine, or glycerine and water, and in solutions of alkalies. It does not redden blue litmus paper. It coagulates albumen. Neutral solution of perchloride of iron strikes a deep purple colour, and bromine water gives a white precipitate with a cold saturated aqueous solution of carbolic acid. Solution of ammonia and of chlorinated soda produce a deep purple coloration, especially after a time.

Off. Prep. **Acidum Carbolicum Liquefactum.** *Liquefied Carbolic Acid.* (Carbolic acid liquefied by the addition of 10 per cent. of water.) A colourless, or very slightly reddish or brownish liquid; sp. gr. 1·064 to 1·067 at 60° F. (15°·5 C.). It dissolves 18 to 26 per cent. of water at

60° F. (15°·5 C.), yielding a clear, or nearly clear solution, from which any slight coloured impurity separates as dark oily drops.

Glycerinum Acidi Carbolici. *Glycerine of Carbolic Acid.* (Carbolic acid, one ounce; glycerine, four fluid ounces; rub them together in a mortar, until the acid is dissolved.)

Suppositoria Acidi Carbolici cum Sapone. *Carbolic Acid Suppositories.* (Carbolic acid, twelve grains; curd soap, one hundred and eighty grains; add enough glycerine of starch to form a paste, and divide the mass into twelve suppositories, each of which will contain one grain of the acid.)

Unguentum Acidi Carbolici. *Ointment of Carbolic Acid.* (Carbolic acid, sixty grains; soft paraffin, seven hundred and twenty grains; hard paraffin, three hundred and sixty grains.)

Therapeutics. Externally applied, the pure acid acts as a powerful caustic and escharotic. It may be used to check bleeding. In a more dilute form, it may be applied to the skin as a stimulant in various chronic dermatoses. The acid is fatal to the lowest forms of life; hence it arrests fermentation and putrefaction. Accordingly, it is much used as an antiseptic dressing for fœtid sores, abscesses, sinuses connected with diseased bone, &c.; also for wounds. (Lister's method.)

Internally, carbolic acid may be given for the same objects as creasote; the latter, however, is more agreeable, both for inhalation and administration by the mouth. When the antiseptic action of the drug is desired in the blood and tissues, the sulphocarbolates may be employed.

The external or internal use of carbolic acid, creasote, or any tarry preparation, may be followed by a change in the colour of the urine, that fluid becoming dark or even black, and letting fall a deposit which presents a superficial resemblance to altered blood. The black matter is, however, entirely derived from the drug; it is an oxidation product of the carbolic acid, probably hydroquinone.

When applied to a large extent of surface, or incautiously inhaled, carbolic acid may give rise to symptoms of poisoning: giddiness, nausea, and vomiting, a feeble pulse, and even convulsions and coma. When accidentally swallowed, the best antidote is olive oil.

Dose. As an external application to ulcers, &c., 1 part of the acid to 7 or 8 of water; or used as the glycerine of carbolic acid; internally, 1 to 3 grains may be administered.

SODII SULPHOCARBOLAS. Sulphocarbolate of Sodium. $NaC_6H_5SO_4,2H_2O$.

Prep. Sulphocarbolic or phenylsulphuric acid is formed by dissolving pure carbolic acid in excess of sulphuric acid. The sulphocarbolic acid formed is supersaturated with carbonate of barium, to precipitate, as sulphate, any free sulphuric acid. The filtrate is then treated with carbonate of sodium, and crystals of sulphocarbolate of sodium are yielded on evaporation.

Prop. Usually met with in whitish lumps, made up of minute, colourless, rhombic prisms. Freely soluble in water; slightly soluble in alcohol, not in ether. A strong heat drives off a portion of the carbolic acid, and an aqueous solution of the residue gives the reactions of a sulphate. The salt is a very stable compound, without any smell of carbolic acid, and with a saline and bitter taste. Its watery solution is quite clear, and gives no precipitate with chloride of barium. The addition of a few drops of perchloride of iron turns it of a beautiful violet colour. A few crystals boiled in nitric acid, are dissolved ; on adding twice its volume of water, yellow scales of picric acid are thrown down, while the supernatant liquid gives a white precipitate with chloride of barium, showing the presence of sulphuric acid.

Therapeutics. The sulphocarbolate of sodium has a decided antiseptic power, though far inferior to that of carbolic acid. It was introduced by Dr. Sansom as a means of indirectly administering the acid, and obtaining its constitutional effects without the nausea and gastric irritation incidental to its direct employment. He asserts that the sulphocarbolate is decomposed in the blood, sulphate of sodium being eliminated in the urine, while the carbolic acid is chiefly got rid of in the breath. It has been used in septic conditions of the blood, in the exanthemata and continued fevers, &c.

Dose. 10 gr. to 15 gr. of the salt, dissolved in water.

ZINCI SULPHOCARBOLAS. Sulphocarbolate of zinc. $Zn(C_6H_5SO_4)_2,H_2O$.

Prep. By heating a mixture of carbolic acid and sulphuric acid, saturating the product with oxide of zinc, evaporating and crystallising.

Prop. It occurs as colourless, tabular efflorescent crystals, and is soluble in rectified spirit and water. An aqueous solution gives a white precipitate with sulphydrate of ammonium (owing to the presence of zinc), and a violet colour with perchloride of iron. It gives no immediate precipitate or only a faint turbidity with chloride of barium, showing the absence, or comparative absence of sulphuric acid or sulphates.

Therapeutics. Sulphocarbolate of zinc is not employed internally. In solution it is frequently made use of as an astringent injection in gonorrhœa and leucorrhœa, a solution of from one to three grains to the ounce being employed.

ACIDUM SALICYLICUM. Salicylic Acid. $HC_7H_5O_3$.

Prep. Salicylic acid may be obtained by the combination of the elements of carbolic acid with those of carbonic acid gas, and subsequent purification. On the addition of caustic soda to carbolic acid sodium phenol is formed; this is dried and submitted to a current of dry carbonic acid gas, di-sodium salicylate being formed.

$$\text{(i.)}\ 2C_6H_5NaO + CO_2 = C_7H_4Na_2O_3 + C_6H_6O.$$

The di-sodium salicylate is distilled over, dissolved in water and acted upon with hydrochloric acid, when salicylic acid and chloride of sodium result.

$$\text{(ii.)}\ C_7H_4Na_2O_3 + 2HCl = HC_7H_5O_3 + 2NaCl.$$

Salicylic acid may also be prepared from natural salicylates, such as the oils of winter green (Gaultheria procumbens) and sweet birch (Betula lenta).

Prop. In white acicular crystals, inodorous, but irritating; taste at first sweetish, then acid. Soluble in 500 to 700 parts of water at ordinary temperatures; readily soluble in alcohol, ether, and hot water; also in solutions of citrate or acetate of ammonium, phosphate of sodium, or borax.

The crystals melt at about 311° F. (155° C.), and volatilise without decomposition below 392° F. (200° C.). An aqueous solution gives a reddish-violet colour with perchloride of iron. An alcoholic solution allowed to evaporate spontaneously should leave a perfectly white residue; if carbolic acid is present, especially if in an impure condition, the residue will be tinged with red or brown.

Off. Prep. **Unguentum Acidi Salicylici.** *Ointment of Salicylic Acid.* (Salicylic acid, sixty grains; soft paraffin, one thousand and eighty grains; hard paraffin, five hundred and forty grains.)

Therapeutics. On account of its action on bacteria, salicylic acid has been employed externally as an antiseptic. It has also been used in diphtheria. The ointment, locally applied, has been found to prevent sweating and soreness of the feet. Dissolved in flexible collodion (1 to 8 or 10) it forms a convenient application for corns and warts.

It is useful to diminish fever and allay pain in acute and chronic rheumatism, but salicylate of sodium is more generally preferred for internal administration. Either remedy will lower the temperature in fevers in a marked degree ; continued for a length of time or given in large doses, they may cause ringing in the ears, deafness, giddiness and headache, effects which may be lessened by ergot, hydrobromic acid, or bromides. Salicylic acid may be employed as an antiperiodic, but its therapeutic value in ague is far less than that of quinine. (*See* Salicin.)

Impurities. Hydrochloric acid, carbolic acid, iron and organic matter. Sometimes salicylic acid prepared from carbolic acid, contains a large percentage of foreign matters. Many practitioners advise the use of the natural acid only, but its price, compared with that of the acid artificially prepared, is very high.

Dose. 5 gr. to 30 gr.

SODII SALICYLAS. Salicylate of Sodium. $(\mathbf{NaC_7H_5O_3})_2$, $\mathbf{H_2O}$.

Prep. By the action of salicylic acid on carbonate of sodium or on caustic soda.

Prop. Small colourless or nearly colourless crystalline scales, inodorous, and having a sweetish saline taste. Slightly soluble in alcohol ; readily soluble in water. If the aqueous solution be acidulated with nitric acid, and the precipitate be dissolved by rectified spirit, not more than traces of sulphates or chlorides should be capable of detection with chloride of barium or nitrate of silver. It dissolves without coloration or effervescence in cold sulphuric acid, showing the absence of organic impurities and carbonates.

Therapeutics. The action of salicylate of sodium is similar to that of salicylic acid. In large doses it lowers the pulse rate, and blood pressure, and may occasionally cause great cardiac depression. It is used especially in acute rheumatism, and its use should be continued some time after the relief of pain and the return to the normal temperature, to guard against any recurrence of the attack. It is said to increase the secretion of bile and to render it more watery, hence it may be employed to prevent the formation of gall-stones. (*See* Salicin.)

Impurities. Similar to those of salicylic acid.

Dose. 10 gr. to 30 gr.; repeatedly administered in acute rheumatism.

PARAFFINUM DURUM. Hard Paraffin. A mixture of several of the harder members of the paraffin series of hydrocarbons.

Synonyms. Paraffin; Paraffin Wax; Solid Paraffin.

Prep. Usually obtained by distillation from shale (a rock of slaty structure often found in the coal measures), and by subsequent refrigeration and purification of the solid product. Boghead coal contains solid paraffin ready formed, which can be extracted by means of ether. It exists also in large quantities in Canadian petroleum and other kinds of rock oil.

Prop. Colourless, semi-transparent, crystalline, inodorous and tasteless; slightly greasy to the touch. It is insoluble in water, slightly soluble in absolute alcohol, freely in ether. It melts at 110° to 145° F. (43°·3 to 62°·8 C.), and burns with a bright flame, leaving no residue. Sp. gr. 0·82 to 0·94.

Use. It is employed as a substitute for animal and vegetable fats in making several official ointments, *e.g.*, those of boric, carbolic and salicylic acids, eucalyptus, &c.

PARAFFINUM MOLLE. Soft Paraffin. A semi-solid mixture containing some of the softer or more fluid members of the paraffin series of hydrocarbons.

Synonyms. Petrolatum; Pétroléine; Unguentum Paraffinum. Known in commerce under various fanciful names, *e.g.*, vaseline, petroleum ointment, &c.

Prep. Usually obtained by purifying the less volatile portions of petroleum.

Prop. It is white or yellowish, translucent, soft and greasy; free from acidity, alkalinity, or any unpleasant odour or flavour, even when warmed to 120° F. (48°·9 C.). It is insoluble in water, slightly soluble in absolute alcohol, freely soluble in ether, chloroform, benzol, &c. It is not saponified by solutions of alkalies. It melts at 95° to 105° F. (35° to 40°·5 C.), volatilises without forming acrid vapours, and burns with a bright flame, leaving no residue. Sp. gr. at the melting point from about 0·840 to 0·870.

Use. It is employed with hard paraffin, instead of animal and vegetable fats, in making several official ointments; also in the preparation of unguentum hydrargyri nitratis dilutum, and unguentum zinci oleati.

ORGANIC SUBSTANCES.

VEGETABLE KINGDOM.

Vegetables should be gathered in dry weather, and not when wet with rain or dew. They should be collected annually, and not be kept beyond a year.

Most roots and rhizomes should be dug up after the old leaves and stalks have fallen, and before the new ones appear.

Barks ought to be collected at the season in which they can be most easily separated from the wood; herbs and leaves should be gathered after the flowers have blown and before the seeds ripen.

Flowers should be gathered recently blown.

Fruits and seeds should be collected when ripe.

The different parts of vegetables should be kept dried for use, except when otherwise directed. Expose those which are to be dried, a short time after they have been gathered, in shallow wicker baskets to a gentle heat in a current of air, in the dark; when the moisture is driven off, gradually increase the heat to 150° F.(65°·6 C.), that they may dry. Finally, preserve the more delicate parts, viz., flowers and leaves, in black glass bottles, well closed, and the rest in vessels, preventing the access of light and moisture.

CLASS I. EXOGENÆ.

Sub-Class I. Thalamifloræ.

RANUNCULACEÆ.

ACONITI FOLIA. Aconite Leaves. The fresh leaves and flowering tops of Aconitum Napellus, Monkshood; gathered when about one-third of the flowers are expanded, from plants cultivated in Britain.

ACONITI RADIX. Aconite Root. The root dried, of Aconitum Napellus, imported from Germany or cultivated in Britain; and collected in winter or early spring, before the leaves have appeared.

ACONITINA. Aconitine. Aconitia. An alkaloid obtained from Aconite Root.

Description. The *leaves* are deep green on the upper surface, lighter beneath, smooth, palmate, five-partite, the segments wedge-shaped and pinnately cut. The *root* is fusiform, like a carrot, from one to three inches long, not thicker than the finger at the crown, with fleshy fibres, dark brown on the surface, whitish within. The *flowers* are deep blue, helmet-shaped, numerous, and in a somewhat loose terminal raceme.

Prop. & Comp. All parts of the plant are bitter and acrid, causing tingling of the lips and skin, followed by numbness; they contain the alkaloid, *Aconitine* ($C_{30}H_{47}NO_7$) united with *Aconitic acid* ($C_6H_6O_6$); another base is also present, which has been named *Aconella*, resembling narcotine in its composition and properties, capable of crystallisation, but not possessing the active properties of Aconitine. The alkaloid Aconitine is prepared by thoroughly exhausting the root by maceration and percolation with rectified spirit; distilling off the spirit, and making a watery solution (with boiling water) of the alcoholic extract; the solution is filtered, and ammonia added in slight excess to the filtered liquid, which is gently heated, the precipitate separated on a filter and dried. The ammonia throws down aconitine mixed with colouring matter. The precipitate is powdered and treated with successive portions of ether, to dissolve the aconitine, leaving the colouring matter behind; the ether is distilled off, and the dry ethereal extract dissolved in warm water acidulated with sulphuric acid (sulphate of aconitine formed), and again precipitated by ammonia. Lastly, the precipitate is washed on a filter with a little cold distilled water, and dried by slight pressure between folds of blotting paper, and subsequent exposure to air.

Aconitine is a white usually amorphous solid, soluble in 150 parts of cold, and 50 parts of hot water, and much more soluble in alcohol and ether; alkaline, neutralising acids, and precipitated from them by the caustic alkalies, but not by carbonate of ammonium, or the bicarbonates of potassium or sodium. It melts with heat, and burns with a smoky flame; causes tingling, followed by numbness, when rubbed on the skin. It is a very active poison; it leaves no residue when burned with free access of air.

Off. Prep.—Of Aconite Leaves. **Extractum Aconiti.** *Extract of Aconite.* (The fresh leaves and flowering tops of aconite are bruised, and the juice treated as directed for the green extracts.) See Introduction.

Of the Root:—

Tinctura Aconiti. *Tincture of Aconite.* (Aconite root, in coarse powder, two ounces and a half; rectified spirit, twenty fluid ounces. Prepared by maceration and percolation.)
This tincture has about one-sixth of the strength of the so-called Fleming's Tincture.

Linimentum Aconiti. *Liniment of Aconite.* (Aconite root, in powder, twenty ounces; camphor, one ounce; rectified spirit, a sufficiency. The product should measure thirty fluid ounces. Prepared by maceration and percolation, and then adding the camphor.)

Of Aconitine:—

Unguentum Aconitinæ. *Ointment of Aconitine.* (Aconitine, eight grains; rectified spirit, half a fluid drachm; benzoated lard, one ounce.)

Therapeutics. Given internally in small doses, aconite produces tingling of the lips and tongue, a peculiar sensation at the palate and pharynx, and warmth at the epigastrium; in large doses tingling often occurs in the extremities, followed by numbness, and a feeling of faintness, with weak and often intermitting action of the heart; occasionally there is a considerable increase in the urinary secretion, and diuresis is produced. Should the patient be suffering pain, this is diminished or removed; if the dose is still larger, alarming symptoms of vascular depression ensue. When an individual is fully under the influence of aconite, the pulsations of the heart are diminished in number, as likewise the frequency of the respirations. In dangerous and fatal doses there is loss of sight, hearing, and feeling, followed by convulsions, syncope, and death. Externally applied, aconite causes at first a tingling of the part, succeeded by numbness, and the cessation of local pain, if present. Aconite appears to cause contraction of the pupil, both when topically applied and when taken internally.

Aconite has been used internally in the treatment of acute and chronic rheumatism, gout, neuralgia, and carcinomatous affections, for the purpose of relieving pain; in hypertrophy and other diseases of the heart, to allay palpitation; in dropsies, on account of its diuretic properties. It is stated to have marked antiphlogistic powers; to be capable of controlling or even cutting short inflammation, and reducing the attendant fever; these effects being probably due to its action on the circulatory organs. (Ringer.) In different forms of neuralgia its internal administration is often attended with marked relief, as in sciatica, and tic douloureux; the same happens in acute and chronic rheumatism, and in muscular rheumatism, as lumbago; inordinate action of the heart can be undoubtedly diminished by its use; and the pain of carcinomatous disease may be lessened; notwithstanding these facts, it is questionable if its internal administration is often desirable, as its effects are only very temporary, and it is at best a dangerous remedy to make use of; at the present time it is not very often employed, or only by a very limited number of practitioners.

Externally applied in the form of the liniment, it is very valuable in different forms of neuralgia, and in chronic rheumatic pains.

Aconitine has the same properties as the aconite leaf and root, and in fact gives to the different parts of the plant their virtues. Its physiological action is still in much need of elucidation. The contradictory results arrived at by different enquirers may probably be due to the difficulty of obtaining the alkaloid in a state of purity. Its depressant influence on the heart is ascribed to over-stimulation of the inhibitory apparatus in the heart itself. It lowers the pulse-rate and blood-pressure, and finally arrests the heart in diastole. Its paralysing effect on the voluntary muscles is probably due to its action on the spinal cord, the sensory being affected before the motor centres. It is doubtful whether it affects the motor nerve-ends; there can be no doubt that it paralyses the cutaneous terminations of the sensory nerves when applied to the skin. It does not act directly on the muscular tissue. Its effect on the pupil is disputed. Aconitine is not given internally, as the one-fiftieth part of a grain may cause very alarming symptoms, but it is much used as an external remedy in the form of the ointment, and is perhaps the most valuable external remedy in cases of facial neuralgia, sciatica, and other forms of neuralgia and muscular pain. When the application is effectual, it almost invariably induces pricking sensation and subsequent numbness of the parts to which it is applied. Sometimes much irritation of the skin is caused by its use; and when applied near the eye, great care should be taken not to allow any to enter that organ, or intense discomfort may be produced.

Dose. Of tincture of aconite, 5 min. to 15 min.; of extract of aconite, ¼ gr. to 1 gr. An *alcoholic extract* is sometimes used, of which the dose should be from ⅙ gr., gradually increased.

Adulteration. Aconitine is very often impure; sometimes it is mixed with Delphinine, and sometimes it contains Aconella, the other principle contained in the root and precipitated with the Aconitine. Pure Aconitine in $\frac{1}{50}$ gr. dose will destroy a dog; but 1 gr. of the spurious alkaloid can often be given without much effect.

PODOPHYLLI RHIZOMA. Podophyllum Rhizome. The dried rhizome and rootlets of Podophylium peltatum, or the American May-apple, called sometimes *Mandrake* in the United States, over which it is extensively diffused, and whence it is imported.

PODOPHYLLI RESINA. Resin of Podophyllum.

Description. Podophyllum occurs in thin rhizomes a few inches long and 2 lines in thickness, brown, jointed, presenting at varying intervals large irregular tuberosities, which are marked above by a depressed circular scar and below give off a variable number of brittle brownish rootlets, or, if these are broken off, presenting a number of whitish scars; it breaks short, and is whitish internally; powder, greyish-yellow, with a sweet odour and sweetish acrid and nauseous taste.

The *resin* or *Podophylline* is an amorphous powder, varying in colour from pale yellow to deep orange brown, and is prepared by the following process:—Podophyllum root in coarse powder is exhausted by percolation with rectified spirit. The spirit is then distilled off, and the remaining liquid slowly poured into three times its volume of water. The deposited resin is afterwards washed on a filter with distilled water, and dried.

Prop. & Comp. Podophyllum contains resinous matters, together with gum and other substances soluble in water; the resin constitutes about 3½ per cent. of the root, and is soluble in rectified spirit and ammonia; it is precipitated from the former by water, from the latter by acids. It is partly soluble in pure ether. Berberine is stated to exist in the root, and to be contained in much of the commercial podophylline. Berberine is contained in larger quantities in the Hydrastis canadensis, and in other plants belonging to the order Ranunculaceæ; also in the Jateorrhiza Calumba and the Common Barberry. It is represented by the formula ($C_{20}H_{17}NO_4$).

Off. Prep. **Tinctura Podophylli.** *Tincture of Podophyllum.* (Resin of podophyllum, one hundred and sixty grains; rectified spirit, one pint.) It contains one grain of the resin in one fluid drachm.

Therapeutics. Podophyllum root is at present seldom employed, as its virtues depend on the resin which is now extensively used. This resin, commonly termed Podophylline, acts as a drastic purgative, not unlike jalap or scammony resins; it is supposed, however, to differ from them in its power of causing an increased secretion or flow of bile; that it frequently causes an emptying of the gall-bladder is certain, but its operation in increasing the secretion of bile is doubtful; for if many evacuations are caused by its action, the latter ones are of a mucous or serous character rather than bilious. Its operation is often accompanied by much griping, and is very uncertain, the same dose at one time producing little effect, at another time, and in the same patient, very troublesome hypercatharsis. It is better to prescribe the resin of podophyllum in combination rather than by itself; and aloes, or colocynth, are the drugs mostly given with it; a little extract of henbane, belladonna, or cannabis indica are useful adjuncts to lessen its griping properties. Resin of podophyllum is much used in congestion of the liver or portal system; and it may be combined with calomel, and acid tartrate of potassium, in dropsies. Externally applied, the resin of podophyllum acts as an irritant; and it has been used in America for the purpose of causing counter-irritation.

Dose. Of the powder, about 10 gr. to 20 gr.; of the resin, $\frac{1}{4}$ gr. to 1 gr.; of the tincture $\frac{1}{2}$ fl. drm. to 1 fl. drm. In combination with other purgatives still smaller doses may be given.

STAPHISAGRIÆ SEMINA. The seeds of Delphinium Staphisagria or Stavesacre. Inhabiting chiefly the southern parts of Europe

Description. The seed is irregularly triangular or obscurely quadrangular, arched, of a brownish black colour, deeply pitted on the surface.

Prop. & Comp. No odour, taste acrid, and nauseously bitter, contains several alkaloids, *Delphinine,* and *Staphisagrine* being the most important, together with resin, fatty matter, wax, lignin, &c.

Off. Prep. **Unguentum Staphisagriæ.** *Ointment of Stavesacre.* (Stavesacre seeds, four ounces; benzoated lard, eight ounces. Crush the seeds, and macerate in the lard melted over a water bath.) This ointment contains about 10 per cent. of oil of stavesacre.

Therapeutics. Staphisagrine paralyses the motor nerves like curare. Delphinine resembles aconitine in causing slowness of pulse and respiration, paralysis of the spinal cord, and death by asphyxia. By depressing the action of the spinal cord, it arrests the convulsions caused by strychnine (Brunton). Externally it has the power of destroying pediculi, and may be used in powder or ointment.

Dose. 3 gr. to 10 gr. in powder and decoction; very seldom used internally.

CIMICIFUGÆ RHIZOMA. Cimicifuga. The dried rhizome and rootlets of Cimicifuga racemosa (Actæa racemosa), the Black Snake Root.

Description. The rhizome is from two to six inches long, half an inch to an inch thick, somewhat flattened cylindrical, with the remains of several aërial stems above, and small wiry brittle-branched rootlets, or portions of rootlets, below. Colour of rhizome and rootlets brownish-black. Fracture, short, the rootlets presenting a thick bark and a triangular, cross-like or stellate arrangement of woody tissue.

Prop. & Comp. Both rhizome and rootlets are almost odourless, and of a bitter slightly acrid taste. They contain when fresh a volatile oil, a resin, and a bitter neutral substance. An infusion is blackened by a persalt of iron, showing the presence of tannin.

Off. Prep. **Extractum Cimicifugæ Liquidum.** *Liquid Extract of Cimicifuga.* (Cimicifuga, twenty ounces; rectified spirit, a sufficiency. Percolate with rectified spirit, evaporate to the consistency of a soft extract, and make up the volume to twenty fluid ounces by the addition of more spirit.)

Tinctura Cimicifugæ. *Tincture of Cimicifuga.* (Cimicifuga, in powder, two ounces and a half; proof spirit, one pint.)

Therapeutics. In large doses it produces nausea, vomiting, depression and headache. It has an action on the heart similar to that of digitalis, but less powerful. Its use is said to have been attended with much success in rheumatic fever, in chorea, and in lumbago, and in some forms of puerperal hypochondriasis. As yet no good clinical evidence of its value in acute rheumatism has been brought forward. It is used as a stomachic and cardiac tonic, and as an expectorant in bronchitis, acute catarrh, and in phthisis.

Dose. Of the extract, 3 min. to 30 min.; of the tincture. 15 min. to 60 min.

MAGNOLIACEÆ.

ANISI STELLATI FRUCTUS. Star Anise Fruit. The dried fruit of Illicium Anisatum. From plants cultivated in China.

Description. This fruit usually consists of eight carpels arranged horizontally in a stellate manner on a short central axis. Each carpel is boat-shaped, beaked, wrinkled, of a rusty brown colour, and commonly split on its upper margin and exposing a solitary seed.

Prop. & Comp. Odour and taste much like those of anise fruit. The star anise yields an oil distilled in China which resembles true anise oil very closely, and which is made official under the name of Oleum Anisi, in conjunction with the oil from the umbelliferous fruit.

Off. Prep. **Oleum Anisi.** (*See* p. 278).

MENISPERMACEÆ.

CALUMBÆ RADIX. Calumba Root. The root cut transversely and dried of Jateorrhiza Calumba. (Cocculus palmatus, D.C.) From the forests of Eastern Africa between Ibo and the Zambesi.

Description. It occurs in small ovoid cylindrical pieces, which are cut into thin disks. These vary in diameter from about 1 inch to 2 or 3 inches, and in thickness from one-eighth to half an inch; the central portion is spongy, yellow, and in concentric layers; the outer portion dark green or olive; the slices usually become concavo-convex in the drying, and thinner in the centre.

Prop. & Comp. Calumba root has little odour, but a very bitter taste. It contains a neutral non-nitrogenised crystallisable principle, called *Calumbin* ($C_{21}H_{22}O_7$), but slightly soluble in water or proof spirit; an acid called *Calumbic* ($C_{21}H_{21}O_7$), and an alkaloid, *Berberine* ($C_{20}H_{17}NO_4$), the salts of which are soluble, and yellow; and give the colour to the root. The calumbate of berberine is contained in the infusion and tincture. Berberine was first found in the Berberis vulgaris, and hence its name. It must not be confounded with Beberine, which is official, and which is obtained from Bebeeru Bark. There is also much starch in the root, hence a decoction of the root when cold is turned dark violet-black by a solution of iodine.

Off. Prep. **Extractum Calumbæ.** *Extract of Calumba.* (Calumba, in powder, one pound; proof spirit, four pints. Prepared by maceration and evaporation to a proper consistence.)

Infusum Calumbæ. *Infusion of Calumba.* (Calumba, in coarse powder, half an ounce; cold distilled water, ten fluid ounces.) An infusion made with cold water should not be coloured by iodine.

Tinctura Calumbæ. *Tincture of Calumba.* (Calumba, bruised, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Calumba root is also contained in mist. ferri aromatica.

Therapeutics. Calumba is a bitter stomachic and tonic, and is useful in debility of the digestive organs, and hence valuable in the non-inflammatory forms of gastrodynia, pyrosis, and vomiting; it is also a stomachic tonic, which is more readily borne by the stomach than any other tonic during recovery from subacute inflammatory affections of this organ; as a general tonic to the system, especially in the early stages of convalescence from acute diseases; it is often usefully combined, in stomachic affections, with an alkali or alkaline bicarbonate, or with the nitrate of bismuth or hydrocyanic acid; it may likewise be administered with the mineral acids.

Dose. Of the powder, 5 gr. to 20 gr., or more; of the extract, 2 gr. to 10 gr.; of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture ½ fl. drm. to 2 fl. drm.

Incompatibles. The cold infusion of calumba contains no starch in solution, and hence does not strike blue with iodine. Calumba may be given with salts of iron, as it contains neither tannin nor gallic acid.

Adulteration. Tinged bryony root, also the root of the Frasera Walteri, and of a Menisperm from Ceylon, have been substituted for true calumba. The two former may be distinguished by their containing hardly any starch.

PAREIRÆ RADIX. Pareira Root. The dried root of Chondodendron tomentosum, a native of Brazil.

Description. It occurs in more or less cylindrical-shaped pieces, entire or split longitudinally, ¾ of an inch to 4 inches in diameter, and 4 inches to 4 feet in length; externally brownish, wrinkled both longitudinally and transversely; internally yellowish-grey, with concentric or more or less eccentric circles and radiating rays; very porous or cancellated in structure.

Prop. & Comp. Odour very slight, taste sweetish and aromatic, then bitter. It contains a crystalline nitrogenised principle, named *Pelosine* or *Cissampeline* ($C_{18}H_{21}NO_3$), a strong base, recently said to be identical with Beberine; besides which there exists some resin, a bitter yellow matter, starch, salts, &c.

Off. Prep. **Decoctum Pareiræ.** *Decoction of Pareira.* (Pareira, sliced, one ounce and a quarter; distilled water, one pint. Boil for fifteen minutes, strain, and make up to a pint.)

Extractum Pareiræ. *Extract of Pareira.* (Pareira root, a pound; boiling distilled water, a gallon, or a sufficiency. Prepared by digestion, percolation, and evaporation of the liquid to a proper consistence for forming pills.)

Extractum Pareiræ Liquidum. *Liquid Extract of Pareira.* (Extract of pareira, four parts, dissolved in a sufficient quantity of a mixture of one fluid part of rectified spirit, and three parts of water to form sixteen fluid parts of liquid extract.) Filter, if necessary.

Therapeutics. Pareira is a bitter tonic, like calumba, but scarcely ever used as such; it is thought to act as a diuretic, and to have an action on the mucous membrane of the bladder. Its use is chiefly confined to chronic catarrhal affections of that viscus, to allay irritation and diminish the mucous discharge; it may be combined with nitric acid or an alkali, according to the state of the urine; likewise with henbane if required; it is used also in chronic pyelitis. The opinions of practitioners as to the value of pareira in bladder affections differ considerably, some regarding it almost as a specific, while others think but little of its medicinal virtues. A real clinical investigation of its merits is still a desideratum.

Dose. Of powder, 30 gr. to 60 gr.; of the decoction, $1\frac{1}{2}$ fl. oz. to 2 fl. oz.; of the extract, 10 gr. to 30 gr.; of the liquid extract, $\frac{1}{2}$ fl. drm. to 2 fl. drm. It is a common plan to strengthen the decoction by the addition of the extract, but this produces a muddy unpleasant mixture; the liquid extract is perfectly clear, contains all the virtues of the root, and forms an elegant mode of administering the drug.

COCCULUS. Cocculus Indicus. (Not official.) The fruit of Anamirta Cocculus, the Cocculus Indicus plant; a climbing shrub, growing in the East India Islands and Malabar coast, &c.

Description. A berry, between a pea and a bayberry in size, consisting of a dark brown exterior, enclosing a wrinkled, bivalved shell, and a reniform yellowish and oily seed, which should fill at least two-thirds of the shell.

Prop. & Comp. Cocculus fruit contains a non-nitrogenised crystalline neutral principle, *Picrotoxine* ($C_5H_6O_2$), which resides in the kernel and forms colourless stellate needles; also an alkaloid, *Menispermine*, united with an acid, *Cocculinic acid*, contained chiefly in the shell.

Prep. **Unguentum Cocculi.** *Ointment of Cocculus.* (The seeds of Cocculus Indicus, eighty grains; prepared lard, an ounce.) Not official.

Therapeutics. Cocculus Indicus, as well as picrotoxine, act upon the nervous system as intoxicating agents, apparently upon the cerebellum; they are not, however, used internally in medicine. Externally, in the form of the ointment, Cocculus Indicus is employed to destroy pediculi, and it is likewise occasionally used in chronic skin diseases.

PAPAVERACEÆ.

PAPAVERIS CAPSULÆ. Poppy Capsules. The nearly ripe dried capsules of Papaver somniferum, the Garden, or Opium Poppy; a native of Syria and Egypt, cultivated in Britain.

Description. The ripe fruit, poppy-heads, or capsules, are globular, from 2 to 3 inches in diameter; of a pale brownish-yellow colour, smooth, often dotted with blackish spots, with a radiating stigma on the top; within are parietal placentæ, and very numerous small pale whitish, slate-coloured, or nearly black, reniform seeds; the texture of the heads is light and papery, with little or no odour, and some bitterish opiate taste.

Prop. & Comp. Besides woody fibre, &c., the capsules contain a small amount of the principles found in opium; and the seeds, called maw seeds, have much bland oil (poppy oil), but possess no narcotic properties. When gathered unripe, more opium is present in the capsules.

Off. Prep. **Decoctum Papaveris.** *Decoction of Poppy.* (Poppy-capsules bruised, two ounces; distilled water, one and a half pint. Boil for ten minutes and strain. The product should be made up to the measure of a pint, by the addition of distilled water.)

Extractum Papaveris. *Extract of Poppies.* (Poppy capsules in powder, free from seeds, one pound; rectified spirit, two ounces; boiling distilled water, a sufficiency. Prepared by maceration with water and percolation: then after partial evaporation of the liquid, by the addition of rectified spirit, subsequent filtration and evaporation to a pilular consistence.)

Syrupus Papaveris. *Syrup of Poppies.* (Poppy capsules free from seeds, in powder, thirty-six ounces; refined sugar, four pounds; boiling distilled water, a sufficiency; rectified spirit, sixteen fluid ounces. Macerate the poppy capsules in the water for twelve hours; evaporate and strain; reduce the strained liquor to three pints, and when quite cold add the spirit, mix and filter; distil off the spirit, evaporate the remaining liquor to two pints, and then add the sugar.) The product should weigh six pounds and a half, and should have sp. gr. of about 1·330. Syrup of Poppies is often badly prepared; at times manufactured from treacle and laudanum.

Therapeutics. The preparations of poppy capsules act in the same manner as opium, but are much weaker, and less certain in their action than most of the official preparations of that drug. The decoction is not given internally, but is employed as an external application to allay pain and soothe. The syrup of poppies is often employed to allay cough, and likewise as an opiate for children; in the latter case, it should be used with great caution. The extract is merely a mild preparation of opium.

Dose. Of the syrup, 1 fl. drm.; for children, ½ fl. drm., cautiously increased, such patients being very susceptible to the influence of opium. Of the extract, 2 gr. to 5 gr.

OPIUM. Opium; Turkey Opium. The juice from the incised unripe fruit of Papaver somniferum, grown in Asia Minor. Inspissated by spontaneous evaporation.

MORPHINÆ ACETAS. Acetate of Morphine. $C_{17}H_{19}NO_3, HC_2H_3O_2, 3H_2O$. The acetate of an alkaloid prepared from opium.

MORPHINÆ HYDROCHLORAS. Hydrochlorate of Morphine. $C_{17}H_{19}NO_3, HCl, 3H_2O$. The hydrochlorate of an alkaloid, prepared from opium.

Synonyms. Morphiæ Hydrochloras; Morphiæ Murias

MORPHINÆ SULPHAS. Sulphate of Morphine $(C_{17}H_{19}NO_3)_2, H_2SO_4, 5H_2O$. The sulphate of an alkaloid prepared from opium.

CODEINA. Codeine. $C_{18}H_{21}NO_3, H_2O$. An alkaloid contained in opium.

Synonym. Codeia.

APOMORPHINÆ HYDROCHLORAS. Hydrochlorate of Apomorphine. $C_{17}H_{17}NO_2,HCl$. The hydrochlorate of an alkaloid obtained by heating morphine or codeine in sealed tubes with hydrochloric acid.

ACIDUM MECONICUM. Meconic Acid. $H_3C_7HO_7$. An acid obtained from opium.

Description. Opium is prepared by making horizontal incisions with a sharp instrument into poppy capsules, a few days after the petals have fallen, taking care not to penetrate the interior; a milky juice exudes, which soon becomes brown, and forms tears; these, when scraped off, and wrought together into masses or cakes, form opium: it is usually enveloped in some leaf.

Any ordinary variety of opium may be employed as a source of alkaloids; but it is directed in the British Pharmacopœia of 1885, that when used for officially recognised purposes, opium must be that obtained from Asia Minor, and must, in the dried state, contain not less than 9·5, nor more than 10·5 per cent. of morphine.

Of *Turkey opium* there are two varieties, viz., Smyrna and Constantinople. *Smyrna* opium occurs in masses more or less flattened, from ¼ to 2 pounds in weight, covered externally with the capsules of a species of rumex; internally, when fresh, it is soft, of a rich brown colour, heavy narcotic odour and bitter taste; it is made up of agglutinated tears. *Constantinople* opium is met with in small lenticular masses, from ¼ to ½ a pound in weight, often inclosed in a poppy leaf, and marked with the midrib; it was at one time inferior to the Smyrna variety.

Besides Turkey opium, there are several other kinds, which are however not official, and should not be employed in making the Pharmaceutic preparations of the drug; among these are—

Egyptian opium, in flat cakes, more or less circular, and about two or three inches in diameter, covered with some leaf (perhaps the poppy); internally hard, of a dark reddish-brown colour, and a musty narcotic odour; it is met with in English commerce, but is very inferior to Turkey opium.

East Indian opium is found in round balls, like twenty-four pound shot, about 4 pounds in weight; covered with a thick case of poppy leaves, agglutinated; internally rather soft and black; called *Chinese investment* opium. East Indian opium also occurs in cakes, called *Malwa*, and *Garden Patna* opium. Nearly all the

Indian opiums are inferior to Turkey opium, and are not found in English commerce.

Other varieties of opium are now and then met with, such as *Persian,* or Trebizond, in sticks, or occasionally in masses, and *European* opiums, as English, French, and German.

Prop. & Comp. Opium is rich in crystalline principles ; it contains a peculiar acid, and several alkaloids and neutral bodies.

The following list comprises all which have hitherto been isolated. The physiological properties of those printed in italics have been more or less fully investigated.

ACIDS. *Meconic.* Thebolactic.

ALKALOIDS.	PRIMARY.	DERIVED.
	Morphine	*Apomorphine.*
	Codeine	*Apocodeine.*
	Codamine.	
	Laudanine.	
	Pseudomorphine.	
	Papaverine.	
	Rhæadine	Rhæagenine.
	Lanthopine.	
	Cryptopine.	
	Meconidine.	
	Thebaïne or *Paramorphine.*	
	Narcotine	Cotarnine.
	Opianine.	
	Porphyroxine.	

NEUTRAL BODIES. *Narceine.*
Meconine or *Opianyl.*

ACIDS.—*Meconic acid* ($H_3C_7HO_7$), a tribasic acid, crystallising in pearly scales containing three molecules of water ; it is sparingly soluble in water, readily soluble in alcohol, and forms insoluble salts with calcium, barium, and lead. Meconic acid strikes blood-red with neutral solution of perchloride of iron. An aqueous solution gives no precipitate with solution of iodine and iodide of potassium, showing the absence of alkaloids.

Thebolactic acid ($C_3H_6O_3$), isomeric, or perhaps identical with lactic acid. Turkey opium contains 2 per cent. of it.

ALKALOIDS.—*Morphine* ($C_{17}H_{19}NO_3$), an alkaloid in the form of six-sided prisms ; soluble in alcohol and caustic fixed alkaline solutions; *very slightly so indeed in ether or water;* its solutions are reddened by nitric acid; it is very sensitive to the action of oxidising agents; it has the power of liberating iodine, hence giving a blue colour to starch, when added to iodic acid; morphine and its salts strike blue with perchloride of iron; and when the solutions are treated with free chlorine, and excess of ammonia afterwards added, a brown colour is produced, disappearing with excess of chlorine.

Acetate of Morphine occurs generally as a white powder; apt to lose a part of its acid; *soluble in 2½ parts of water at ordinary temperatures,* also soluble in alcohol. When sulphuric acid is added to the salt, acetous vapour is evolved. It gives reactions with nitric acid, perchloride of iron, and potash, in the same way as hydrochlorate of morphine.

Acetate of Morphine is prepared by precipitating morphine from a solution of the hydrochlorate by means of ammonia; and redissolving it in a solution of acetic acid, evaporating to dryness and pulverising.

Hydrochlorate of Morphine when pure is found in white powder or thin prisms of a silky lustre; *requires about twenty-four parts of water to dissolve it;* soluble in spirit; when pure, both this salt and the acetate are entirely dissipated at a red heat. The aqueous solution gives a white curdy precipitate with nitrate of silver, and a white one with potash, redissolved by excess. Moistened with strong nitric acid, it becomes orange red; with perchloride of iron, greenish blue. Twenty grains of the salt dissolved in half an ounce of warm water, with ammonia added in the slightest possible excess, give on cooling a crystalline precipitate, which when washed with a little cold water, and dried by exposure to air, weighs 16 grains.

Hydrochlorate of Morphine is prepared by thoroughly exhausting opium with water, and evaporating to a small bulk, so that one pint of fluid shall contain the soluble matter of one pound of opium. This watery solution contains the meconate and lactate of morphine and codeine, with some other unimportant substances. To this is added a strong solution of chloride of calcium, whereby meconate and lactate of calcium, with some resins, are precipitated, and the chlorine combines with the morphine and codeine. The whole is evaporated till it forms a solid mass when cool, and then enveloped in two folds of calico, and subjected to powerful pressure, which removes the mother liquor, containing much colouring matter. The cake is then triturated with about half a pint of boiling water, which dissolves the hydrochlorate of morphine and codeine mainly; thrown on a filter and washed. The filtered liquor is again evaporated, and allowed to cool and solidify; pressed, dissolved as before, evaporated, and again allowed to solidify; if the mass is still much coloured, this process may again be repeated. The pressed cake is finally dissolved in six ounces of boiling water, with animal charcoal, for twenty minutes, to remove the last trace of colouring matter, and then, after filtration, ammonia is added in slight excess, which precipitates the morphine, leaving the codeine in solution. The pure crystalline morphine which separates is collected and dried. This is dissolved in hydrochloric acid, and the hydrochlorate of morphine allowed to crystallise. An additional quantity of morphine may be obtained from the dark liquids expressed, by diluting them with water, precipitating with potash in excess, filtering, saturating with hydrochloric acid, and purifying with animal charcoal.

Hydrochlorate of Apomorphine ($C_{17}H_{17}NO_2,HCl$). Obtained by heating morphine or codeine in a closed tube for several hours with excess of hydrochloric acid. This removes one molecule of water from the morphine.

$$C_{17}H_{19}NO_3 + HCl = C_{17}H_{17}NO_2,HCl + H_2O.$$

It is composed of small, greyish-white shining acicular crystals, turning green on exposure, inodorous, feebly acid. Soluble in water, sparingly soluble in alcohol, the solutions decomposing and giving a green colour on boiling. Bicarbonate of sodium gives with solutions of hydrochlorate of apomorphine a precipitate which becomes green on standing, and then forms a purple solution with ether, violet with chloroform, and bluish-green with alcohol. It gives a deep red colour with dilute solution of perchoride of iron, and a blood-red colour with nitric acid.

Codeine ($C_{18}H_{21}NO_3,H_2O$), an alkaloid separated from the ammoniacal liquors from which morphine has been obtained, by evaporating, treating the residue with water, precipitating with caustic potash, and purifying the precipitated alkaloid by recrystallisation from ether. It forms colourless, or nearly colourless octahedral crystals; soluble in eighty parts of water and of solution of ammonia, readily soluble in alcohol, ether, chloroform and dilute acids. The solution in sulphuric acid gently warmed with molybdate of ammonium, or a trace of perchloride of iron, assumes a deep blue colour, with strong nitric acid it becomes yellow but not red. Opium contains from ¼ to 1 per cent. of this alkaloid.

Apocodeine (Matthiessen and Burnside) ($C_{18}H_{19}NO_2$). By depriving codeine of one molecule of water.

Codamine ($C_{20}H_{25}NO_4$). Soluble in alcohol, ether, and boiling water. Solutions alkaline. Salts bitter. Forms a dark-green solution with strong nitric acid.

Laudanine ($C_{20}H_{25}NO_4$). In stellate groups of small, colourless, six-sided prisms. Tasteless. Salts bitter. Dissolves in chloroform and benzol; sparingly in alcohol. Turned orange-red by nitric acid.

The quantity of codamine and laudanine contained in opium is small. A sample of Turkey opium which yielded 8·3 per cent. of morphine, had only ·0033 per cent. of codamine and ·0052 of laudanine.

Pseudomorphine ($C_{17}H_{19}NO_4$). A white, finely-crystalline precipitate, insoluble in water, alcohol, and ether. With nitric acid, forms a deep orange-red solution, turning to yellow.

Papaverine ($C_{21}H_{21}NO_4$). In delicate, colourless prisms, without action on litmus.

Rhœadine ($C_{21}H_{21}NO_6$). In small, white prisms, nearly insoluble in ether, alcohol, chloroform, and water. This base is tasteless and not poisonous. By the action of dilute mineral acids it is converted into its isomer, *Rhœagenine.* May be viewed as dioxypapaverine.

Lanthopine ($C_{23}H_{25}NO_4$). Homologous with papaverine. Minute with prisms. Tasteless. Does not affect litmus. Insoluble in water and alcohol; soluble in chloroform. Good Turkey opium contains ·0058 per cent.

Cryptopine ($C_{21}H_{23}NO_5$). Colourless, six-sided prisms, readily soluble in chloroform, hardly at all in ether and water. Forms salts—neutral and acid—with a bitter taste. With strong sulphuric acid gives a deep violet colour, turning to orange-yellow on the addition of nitre. Difficult to obtain quite free from thebaïne. A ton of opium yields only one ounce of the base.

Meconidine ($C_{21}H_{23}NO_4$). Contains 2 atoms more **H** than papaverine. A brownish, resinoid mass, splitting up into laminæ when touched. Tasteless. Insoluble in water; soluble in alcohol, ether, and chloroform. The alcoholic solution gives a blue colour to red litmus. Its salts are very unstable. Homologous with *Sanguinarine,* an alkaloid contained in Chelidonium majus, a papaveraceous plant.

Thebaïne or *Paramorphine* ($C_{19}H_{21}NO_3$). Insoluble in water; very soluble in alcohol and ether. Does not give the tests of morphine. Crystallises in square plates of a silvery lustre. Taste acrid and styptic.

Narcotine ($C_{22}H_{23}NO_7$). Neutral, in brilliant prisms, insoluble in water and alkalies; soluble in alcohol, ether, and acids, with the latter of which it forms acid crystalline salts. Heated with water, it splits up into *meconine* and *cotarnine.*

$$\underset{\text{Narcotine.}}{C_{19}H_{14}(CH_3)_3NO_7} = \underset{\text{Meconine.}}{C_8H_4(CH_3)_2O_4} + \underset{\text{Cotarnine.}}{C_{11}H_{10}(CH_3)NO_3}.$$

Opianine, a principle found as yet only in Egyptian opium, resembling narcotine, and perhaps identical with it.

Porphyroxine, a crystalline principle, distinguished by becoming purple when heated with dilute hydrochloric acid; its nature is but little understood.

NEUTRAL BODIES. *Narceine* ($C_{23}H_{29}NO_9$), readily soluble in boiling water. Sulphurous acid dissolves it; the solution has a rich amber colour, rapidly passing through greenish-orange to a port-wine hue. Iodine colours its solution blue.

Meconine or *Opianyl* ($C_{10}H_{10}O_4$). May be obtained from narcotine (*quod vide*). In colourless hexagonal prisms with dihedral summits. Tasteless at first, but developes an acrid flavour as it dissolves in the mouth. Very sparingly soluble in cold water; more so in alcohol and ether; freely soluble in chloroform. Opium contains from ·1 to ·2 per cent.

Besides these crystallisable bodies, opium contains several different *Resins,* hitherto but little examined, also gummy, extractive, and fatty matters, caoutchouc, a trace of *volatile oil,* and inorganic salts. Analyses of opium have given the following per-centage of constituents: Morphine, 6 to 12; Codeine, less than 1; Narcotine, 6 to 8; Narceine, less than 1; Meconine, less than 1; Meconic acid, 6 to 8; Resin, 10·93; Bassorine, caoutchouc, fat, and lignin, 26·25; salts and volatile oil, 3·60; earthy salts, &c., 0·71; brown acid, gum, &c., 41·17.

The following analyses of opium were made by Schindler :—

	Smyrna Opium.	Constantinople Opium.	Egyptian Opium.
Morphine	10·30	4·50	7·00
Codeine	0·25	0·52	
Narcotine	1·30	3·47	2·68
Narceine	0·71	0·42	
Meconine	0·08	0·30	
Meconic Acid	4·70	4·38	
Peculiar Resin	10·93	8·10	
Vegetable mucus, caoutchouc, acid, fat, and vegetable fibre	26·25	17·18	
Brown acid soluble in water and alcohol	1·04	0·40	
Brown acid soluble only in water, also gum	40·13	50·46	
Calcium	0·40	0·02	
Magnesia	0·07	0·40	
Alumina, Ferric Oxide, Silica, Calcic Phosphate	0·24	0·22	
Salts and vegetable oil (about)	0·36	0·36	
	96·76	96·73	

The British Pharmacopœia gives the following test for ascertaining the quantity of morphia present in opium :—

Take of powdered opium, dried at 212°F. (100°C.) 140 grains; lime, freshly slaked, 60 grains; chloride of ammonium, 40 grains; rectified spirit, ether, and distilled water, of each a sufficiency. Triturate together the opium, lime, and 400 grain-measures of distilled water in a mortar until a uniform mixture results; then add 1000 grain-measures of distilled water and stir occasionally during half an hour. Filter the mixture through a plaited filter about three inches in diameter into a wide-mouthed bottle or stoppered flask (having the capacity of about six fluid ounces, and marked at exactly 1040 grain-measures) until the filtrate reaches this mark. To the filtered liquid (representing 100 grains of opium) add 110 grain-measures of rectified spirit and 500 grain-measures of ether, and shake the mixture; then add the chloride of ammonium, shake well and frequently during half an hour and set it aside for twelve hours. Counterbalance two small filters; place one within the other in a small funnel and decant the ethereal layer as completely as practicable upon the inner filter. Add 200 grain-measures of ether to the contents of the bottle and rotate it; again decant the ethereal layer upon the filter, and afterwards wash the latter with 100 grain-measures of ether added slowly and in portions. Now let the filter dry in the air, and pour upon it the liquid in the bottle in portions, in such a way as to transfer the greater portion of the crystals to the filter. When the fluid has passed through the filter, wash the bottle and transfer the remaining crystals to the filter, with several small portions of distilled water, using not much more than 200 grain-measures in all, and distributing the portions evenly upon the filter. Allow the filter to drain, and dry it, first by pressing between sheets of bibulous paper, and afterwards at a temperature between 131° and 140° F. (55° and 60° C.), and, finally, at 194° to 212° F. (96° to 100° C.). Weigh the crystals in the inner filter, counterbalancing by the outer filter. The crystals should weigh 10 grains, or not less than 9·5 and not more than 10·5 grains, corresponding to about ten per cent. of morphine in the dry powdered opium.

Off. Prep.—Of Opium:—

Confectio Opii. *Confection of Opium.* (Compound powder of opium, one hundred grains; syrup, three hundred grains.)

Emplastrum Opii. *Opium Plaster.* (Opium, in very fine powder, one ounce; resin plaster, nine ounces.)

Enema Opii. *Enema of Opium.* (Mucilage of starch, two fluid ounces; tincture of opium, thirty minims. Mix.)

Extractum Opii. *Extract of Opium.* (Opium, in thin slices, one pound; distilled water, six pints. Prepared by macerating the opium, three times, for twenty-four hours each time, in two pints of water, mixing the liquors, straining and reducing by evaporation until the product weighs half a pound.) This extract should contain about 20 per cent. of morphine.

Extractum Opii Liquidum. *Liquid Extract of Opium.* (Extract of opium, one ounce; distilled water, sixteen fluid ounces; rectified spirit, four fluid ounces.) Should contain one per cent. of morphine.

Linimentum Opii. *Liniment of Opium.* (Tincture of opium, two fluid ounces; liniment of soap, two fluid ounces.)

Pilula Saponis Composita. *Compound Pill of Soap.* (Opium, in fine powder, half an ounce; hard soap, two ounces; glycerine, a sufficiency.)

One grain of opium is contained in six grains of the pill mass, nearly.

Pilula Plumbi cum Opio. *Pill of Lead and Opium.* (Acetate of lead, in fine powder, thirty-six grains; opium, in powder, six grains; confection of roses, six grains.)

One grain of opium is contained in eight grains of the pill mass.

Pilula Ipecacuanhæ cum Scilla. *Pill of Ipecacuanha with Squill.* (Compound powder of ipecacuanha, three ounces; squill and ammoniacum in powder, of each one ounce; treacle, a sufficiency.)

One part of opium in twenty-three parts of the pill mass, nearly.

Pulvis Cretæ Aromaticus cum Opio. *Aromatic Powder of Chalk and Opium.* (Aromatic powder of chalk, nine ounces and three quarters; opium, in powder, a quarter of an ounce.)
One part of opium in forty parts of the powder.

Pulvis Ipecacuanhæ Compositus. *Compound Powder of Ipecacuanha.* (Ipecacuanha, in powder, half an ounce; opium, in powder, half an ounce; sulphate of potassium, four ounces.)
One part of opium in ten parts of the powder. This preparation is also known as *Dover's powder.*

Pulvis Kino Compositus. *Compound Powder of Kino.* (Kino, in powder, three ounces and three quarters; opium, in powder, a quarter of an ounce; cinnamon, in powder, one ounce.)
One part of opium in twenty parts of the powder.

Pulvis Opii Compositus. *Compound Powder of Opium.* (Opium, an ounce and a half; black pepper, two ounces; ginger, five ounces; caraway fruit, six ounces; tragacanth, half an ounce.)
One part of opium in ten parts of the powder.

Suppositoria Plumbi Composita. *Compound Lead Suppositories.* (Acetate of lead, thirty-six grains; opium, in powder, twelve grains; oil of theobroma, one hundred and thirty-two grains. Divide into twelve suppositories.) Each suppository contains three grains of acetate of lead, and one grain of opium.

Tinctura Opii. *Tincture of Opium.* (Powdered opium, one ounce and a half; proof spirit, one pint. Prepared by maceration.)
Thirty-three grains of dry opium are contained in one fluid ounce, nearly; or one grain of dry opium is contained in about fourteen and a half minims of the tincture.

Tinctura Camphoræ Composita. *Compound Tincture of Camphor.* (Opium, in coarse powder, forty grains; benzoic acid, forty grains; camphor, thirty grains; oil of anise, half a fluid drachm; proof spirit, one pint. Prepared by maceration.)
Two grains of opium are contained in one fluid ounce of this tincture. This preparation is often termed *Paregoric Elixir.*

Tinctura Opii Ammoniata. *Ammoniated Tincture of Opium.* (Opium in coarse powder, one hundred grains; saffron and benzoic acid each, one hundred and eighty grains; oil of anise, one fluid drachm; strong solution of ammonia, four fluid ounces; rectified spirit, sixteen fluid ounces.)
Five grains of opium are contained in one fluid ounce.

Trochisci Opii. *Opium Lozenges.* (Extract of opium, seventy-two grains; tincture of tolu, half a fluid ounce; refined sugar, sixteen ounces; gum acacia, in powder, two ounces; extract of liquorice, six ounces; distilled water, a sufficiency. To make 720 lozenges.)
Each lozenge contains one-tenth of a grain of extract of opium, or one-fiftieth of a grain of morphine.

Unguentum Gallæ cum Opio. *Ointment of Galls and Opium.* (Ointment of galls, one ounce; opium, in powder, thirty-two grains.)
Thirty-two grains of opium are contained in one ounce of the ointment.

Vinum Opii. *Wine of Opium.* (Extract of opium, an ounce; cinnamon bark and cloves, in powder, of each seventy-five grains; sherry, a pint. Macerate.) It contains nearly twenty-two grains of extract of opium in a fluid ounce. Each fluid drachm contains about half a grain of morphine.

Opium is also contained in Suppositoria Plumbi Comp.

Of Hydrochlorate of Morphine:—

Liquor Morphinæ Hydrochloratis. *Solution of Hydrochlorate of Morphine.* (Hydrochlorate of morphine, nine grains; dilute hydrochloric acid, eighteen minims; rectified spirit, half a fluid ounce; distilled water, one fluid ounce and a half.)

This preparation contains one per cent. of hydrochlorate of morphine.

Suppositoria Morphinæ. *Morphine Suppositories.* (Hydrochlorate of morphine, six grains; oil of theobroma, one hundred and seventy-four grains; to make twelve suppositories.)

Each suppository contains half a grain of hydrochlorate of morphine.

Suppositoria Morphinæ cum Sapone. *Morphine Suppositories with Soap.* (Hydrochlorate of morphine, six grains; glycerine of starch, thirty grains; curd soap, one hundred grains; add enough starch to form a paste, and divide the mass into twelve equal parts.)

Each suppository contains half a grain of hydrochlorate of morphine.

Tinctura Chloroformi et Morphinæ. *Tincture of Chloroform and Morphine.* (*See* **Chloroform.**) A ten-minim dose contains chloroform, one minim and a quarter; ether, one-third of a minim; rectified spirit, one minim and a quarter; hydrochlorate of morphine, one-forty-eighth of a grain; diluted hydrocyanic acid, five-eighths of a minim; &c.

Trochisci Morphinæ. *Morphine Lozenges.* (Hydrochlorate of morphine, twenty grains; tincture of tolu, half a fluid ounce; refined sugar, in powder, twenty-four ounces; gum acacia, in powder, one ounce; mucilage of gum acacia, a sufficiency; distilled water, half a fluid ounce. Divide into 720 lozenges.)

Each lozenge contains one thirty-sixth of a grain of hydrochlorate of morphine.

Trochisci Morphinæ et Ipecacuanhæ. *Morphine and Ipecacuanha Lozenges.* (Hydrochlorate of morphine, twenty grains; ipecacuanha, in fine powder, sixty grains; and the other ingredients, in the same quantities, as for the morphine lozenges.)

Each lozenge contains one thirty-sixth of a grain of hydrochlorate of morphine, and one-twelfth of a grain of ipecacuanha.

Of Acetate of Morphine:—

Liquor Morphinæ Acetatis. *Solution of Acetate of Morphine.* (Acetate of morphine, nine grains; dilute acetic acid, eighteen minims; rectified spirit, half a fluid ounce; water, one fluid ounce and a half.)

About one per cent. of acetate of morphine is contained in this preparation. It may also be prepared by diluting ninety minims of the hypodermic injection of morphine with sufficient of a mixture of one volume of rectified spirit, and two volumes of water to form two fluid ounces of the solution.

Injectio Morphinæ Hypodermica. *Hypodermic Injection of Morphine.* A solution of acetate of morphine, containing *one grain of the salt in ten minims.* (Prepared by dissolving ninety-two grains of hydrochlorate of morphine in two ounces of distilled water with the aid of heat. Ammonia is added to precipitate the alkaloid, which is dissolved in an ounce of distilled water to which acetic acid is added in quantity sufficient to render the solution slightly acid. Enough distilled water is then added to make the solution up to two fluid ounces. Filtered and preserved in a stoppered bottle, excluded from the light.) The product should be perfectly clear and very slightly acid to test paper. A fluid drachm of it rendered slightly alkaline by the addition of solution of ammonia, yields a precipitate of morphine which, after being washed and dried, should weigh 4·25 grains, corresponding to 6 grains of acetate of morphia.

Of Hydrochlorate of Apomorphine:—

Injectio Apomorphinæ Hypodermica. *Hypodermic Injection of Apomorphine.* (Hydrochlorate of apomorphine, two grains; camphor water, one hundred minims. Dissolve and filter. The solution should be made as required for use.)

The solution contains two per cent. of hydrochlorate of apomorphine.

Of Meconic Acid:—

Liquor Morphinæ Bimeconatis. *Solution of Bimeconate of Morphine.* (Hydrochlorate of morphine, nine grains; meconic acid, six grains; rectified spirit, half a fluid ounce; solution of ammonia and distilled water, of each a sufficiency. Dissolve the hydrochlorate of morphine in distilled water, aiding the solution by warmth; precipitate with solution of ammonia; wash the precipitate with distilled water until the washings give no precipitate with nitrate of silver, indicating freedom from hydrochloric acid or chloride of ammonium; mix the precipitate with an ounce and a half of distilled water, and dissolve it by adding the rectified spirit and meconic acid.) The product should be colourless or nearly so. With potash it gives a white precipitate soluble in excess; with nitric acid it acquires an orange-red colour, and with neutral solution of perchloride of iron, a blood-red colour which is discharged by the addition of strong hydrochloric acid.

This solution contains about one and a quarter per cent. of bimeconate of morphine ($C_{17}H_{19}NO_3$, $C_7H_4O_7$). The solution, as regards meconate of morphine, is about the same strength as tincture of opium.

Therapeutics. Inasmuch as the physiological action of opium is but the aggregate of the separate actions of its constituent principles, those which are present in largest proportion producing the major part of the effect, it may be well to give a brief summary of what is known concerning the action of the individual principles before going on to speak of that of the crude drug. Numerous discrepancies still exist upon the subject; discrepancies due on the one hand to the difficulty of isolating the principles in a state of chemical, and still more, in a state of "physiological" purity, on the other to differences of idiosyncrasy among the various animals chosen for experiment.

Speaking broadly, the active constituents of opium may be arranged in a series, the two extreme members of which are meconine and thebaïne, the former exhibiting purely hypnotic, the latter purely convulsant properties. Between these two extremes the various active principles occupy different positions;

morphine, the most abundant of them, and also the most important one from a practical point of view, possessing both convulsant and hypnotic powers; the latter being predominant in the case of the human subject.

1. *Thebaïne* exhibits purely convulsant properties, exciting tetanic spasms, like strychnine and brucine, which it resembles in its physiological action. Bernard regards it as the most poisonous of the opium alkaloids. Administered to the dog, it causes tetanus, and speedy death from asphyxia; in doses less than fatal, its action is transient, probably because it is rapidly eliminated. It has no hypnotic or anodyne power. Fraser and Crum Brown have shown that the salts of methyl-thebaïne resemble curare in causing paralysis by destroying the activity of the end-organs of the motor nerves. (*See* Strychnine.) Rabuteau, from experiments on man, concludes that, dose for dose, thebaïne is less poisonous than morphine. As a tetanising agent, it is inferior to strychnine and brucine.

2. *Morphine* has both a soporific and a convulsant action. In some animals it appears to produce almost exclusively hypnotic, in others almost exclusively tetanic symptoms. In man, the hypnotic effect usually predominates over the convulsant one to such a degree that the latter is wholly masked. Individuals are met with, however, whose idiosyncrasy is such as to render them peculiarly susceptible to the latter effect of the alkaloid.

Clinical experience has shown that morphine possesses the anodyne and soporific powers of opium, and gives to the drug most of its valuable properties. At the same time its action is, as a rule, more agreeable, having less tendency to cause headache, nausea, and constipation; it is also much less stimulant in its operation, and does not produce the full diaphoretic effects of opium. Although only about 10 per cent. of morphine is contained in good opium, the alkaloid is not more than four times as strong as the crude drug, showing that other principles must contribute appreciably to the effects of the latter substance. Since the subcutaneous method of administration has become general the use of morphine to alleviate pain and spasm has been much extended. It is stated to cause less constitutional disturbance when given hypodermically than by the mouth. Moreover, in some rare cases it seems to give more effectual and permanent relief when injected at the seat of pain, than when introduced elsewhere. The smallness of the dose required, and the rapidity of its operation, are two practical advantages of the hypodermic method.

In other respects, morphine resembles opium in its therapeutic effects, and must be given with the same precautions.

The bimeconate of morphine, given by the mouth or hypodermically, is said to cause less headache and constipation than other salts of morphine.

The salts of methyl-morphine have been shown to retain the hypnotic power of morphine, while losing all trace of its convulsant action. Moreover, they cause paralysis by acting on the end-organs of the motor nerves.

3. *Cryptopine*, like morphine, exerts both a convulsant and a hypnotic action on the dog. In man, no excitant effect has been noticed. It is a good hypnotic, twice as active as meconine, and a quarter as powerful as morphine. In large doses, it is said to dilate the pupil. (John Harley.) It causes death by apnœa.

4. *Codeine* gives rise to tetanic spasms and sleep when administered to rabbits. Bernard places it next to thebaïne as a poison; his alkaloid was probably impure. In man, it has a feeble soporific action; one to two grains, given subcutaneously, being required to produce this effect in persons susceptible to it. It quickens the pulse and contracts the pupils. As an anodyne it is useless; the author having repeatedly found five grains of codeine fail to relieve pain (in the case of a patient suffering from a tumour pressing on a nerve) which was always readily subdued by the fourth of a grain of morphine. The hypnotic effect of codeine is wholly destroyed by its conversion into methyl-codeine, which resembles curare in its action on the terminations of the motor nerves.

5. *Narceine.* From experiments on dogs, Bernard concludes that its narcotic action is superior to that of morphine. Harley finds that it is a pure hypnotic, much feebler than morphine. Given hypodermically, 1 gr. is equivalent to ⅛ gr. of morphine. Five grains by the mouth induced only slight drowsiness. Narceine is very insoluble, and irritates the skin at the point of injection; it is eliminated by the kidneys, causing dysuria and even anuria, by blocking up the uriniferous tubes. It causes profound sleep in dogs, during which, however, they are aware of painful sensations. It is useless as a medicine.

6. *Papaverine* has been clinically studied by Leidesdorf. The hydrochlorate is soporific and narcotic. It reduces the pulse; relaxes the voluntary muscles; and causes slight looseness of the bowels. Its effects are manifested in about three hours after its administration by the mouth, and continue for 24-48 hours. *Dose*, ½ gr. to 1 gr. by the mouth; ¼ gr. to ½ gr. subcutaneously.

7. *Meconine* or *Opianyl* acts on man as a mild hypnotic. Its effects are identical with those of narceine, but slightly more powerful. It does not irritate the skin at the point of injection, or cause dysuria. Given by the mouth it exerts no appreciable effect. From ½ gr. to 2 gr. may be given subcutaneously. (J. Harley.)

8. *Narcotine* was at one time supposed to be the narcotic principle of opium, but it is now known not to be so. It probably acts as a tonic and antiperiodic ; the author has given it with this end in view in half-drachm doses without the production of any narcotic symptoms.

9. *Apomorphine* has none of the characteristic properties of morphine. It is a powerful emetic. A dog was injected with it daily for five weeks, without any tolerance of the drug being established. In small doses it simply caused vomiting, while larger ones (3 gr. and upwards) did not give rise to this effect, but caused symptoms of poisoning, *sc.*, weakness of hind limbs, staggering gait, salivation. It produced no effect on the sensory or motor nerves, on the muscles, or on the blood-pressure. Chloroform narcosis prevented its emetic action. In man, ·15 to ·3 gr. given by the mouth, cause vomiting, without previous nausea, in ten minutes. The solution subcutaneously administered produces the same effect in doses of from two to eight minims. It depresses the pulse slightly, like ipecacuanha. No irritation of the skin is caused at the point of injection. It is introduced into the Pharmacopœia as a speedy and safe emetic, which can be employed subcutaneously in cases of irritant poisoning or of impending asphyxia from the impaction of foreign bodies in the œsophagus or air passages.

10. *Apocodeine* resembles apomorphine in its action, but is much weaker. Moreover, it causes local irritation when given by the skin.

11. *Meconic Acid* has very little physiological action. It has been stated to have narcotic properties, but they are very feeble.

The actions of the other crystalline principles of opium are as yet almost unknown ; the resinous matter (containing minute quantities of lanthopine, laudanine, &c.) possesses considerable power, and in one case in which it was administered in rather large doses, giddiness and great contraction of the pupils ensued.

Therapeutics of Opium. Opium, when taken internally, in small doses produces at first some excitement of the vascular and nervous systems, shown by increased fulness and rapidity of the pulse, exaltation of the mental functions, and very pleasant sensations ; these after a time are followed by a feeling of drowsiness, and at last by sound sleep, often accompanied with perspiration; on awakening, the individual usually feels some nausea and headache, the tongue is furred, there is loss of appetite, thirst, and a torpid state of the bowels. If pain or spasm be present, these are relieved, while at the same time the influence of the drug in producing sleep is much diminished. The stimulant effect of opium does not last long, usually not more than half an hour, and when the dose is large and the patient unaccustomed to the drug, it is often scarcely noticed, the soporific influence being very speedily produced; certain conditions of the system and the previous long-continued use of the medicine hinder or prevent the soporific effect, but favour the development of the symptoms of excitement; when large doses are taken the sleepiness becomes intense, and there is great difficulty in awakening the patient; in still larger doses poisonous symptoms ensue, the sleep passing into a condition of stupor or coma, with gradually increasing slowness of respiration, feebleness of pulse, cold perspiration, and contracted pupils, followed by death.

The influence of opium upon the different organs and functions of the body may be thus enumerated :—

On the *Digestive Organs;* it impairs appetite and the digestive process, causes thirst, diminishes the secretions from the whole mucous membrane, and induces constipation.

On the *Brain* and *Nervous System* the action of opium is most powerfully exerted, as is shown in the primary exaltation of the mental faculties and the subsequent sleep and coma; the pupils of the eyes become contracted, even to a point, when the patient is powerfully under the influence of the drug; the spinal cord is sometimes affected, and tetanic symptoms may occur.

On the *Vascular System;* opium acts at first as a stimulant and then as a sedative; both effects are probably induced through the medium of the nervous system; when given in small doses, frequently repeated, the force of the circulation can be kept up for a long time.

On the *Cutaneous System;* opium causes free perspiration, an effect for which the drug is often prescribed, and which is much increased by combination with ipecacuanha, camphor, &c.

On the *Secreting* and *Excreting Organs*, with the exception of the skin, the effect of opium is to lessen their activity; the bile is diminished, as seen in the pale-coloured fæces; the urine often becomes scanty, and also the saliva and buccal mucus.

On the *Respiratory System*, opium produces a sedative effect, diminishing the frequency of the respirations, and hence impairing the oxidation of the blood.

On the *Sexual System*, opium acts as a stimulant, especially in males, and has been employed in Eastern countries as an aphrodisiac.

Applied to the skin, opium appears to possess some power of allaying pain, and is often added to fomentations. When the cutis is denuded, the opium and morphine salts become absorbed and produce constitutional effects. Applied also to the mucous membrane of the rectum in the form of suppository or enema, not only the local but the general symptoms of the drug are produced. Within the last few years, opium, and more especially the salts of morphine, have been extensively employed in the form of subcutaneous injection. When opium or morphine is applied to the conjunctiva it does not cause contraction of the pupil, although this phenomenon results from its internal administration.

The effects of opium compared with those produced by belladonna will be found discussed under the latter medicine.

Opium is perhaps more extensively used than any other drug, and of such value is it, that it has been called the "gift of God" to man.

It may be employed to allay *pain* and *spasm*, occurring in almost any condition of the system, as in the varieties of neuralgia and colic, during the passage of renal or biliary calculi, in tetanus and inflammations of various kinds ; in short, pain, from whatever cause arising, is usually advantageously treated by opium.

In *Inflammation* it is given not only to assuage pain and spasm, but to control diseased action ; opium seems to have some power over the capillary circulation, which is advantageously made use of after depletion ; perhaps this may be exercised through the medium of the nervous system ; it is very commonly given, combined with calomel, in cases of inflammation, where it is valuable not only for the influence it exerts over the disease, but also from its preventing the mercurial salt from running off by the bowels. Opium is given with tartar emetic, in several forms of inflammation. In inflammation of mucous membranes, opium may or may not be useful; when the air passages are affected, it should be cautiously administered ; but when the intestinal tube is involved, as in dysentery, its property of checking secretion and allaying irritability is of much value.

In *Fevers* opium may be sometimes used when nervous symptoms, as tremor and watchfulness, occur, attended with deficient power of the heart; it should always be given in small doses, and the effects watched. In intermittent fevers or agues, opium sometimes suffices for the cure, when given before the time of accession of the cold stage; but there are other remedies which possess greater antiperiodic powers, without the narcotic properties of opium.

In diseases of the *Nervous System*, when attended with increased vascular action, opium is generally injurious; but the value of the drug becomes very evident when there is defective power of the circulation, as in delirium tremens, and allied affections.

In *Hæmorrhages*, opium is often useful, especially when there has been much loss of blood, and consequent excitement of the pulse; whether the drug acts as a direct astringent is doubtful; it is usually combined in such cases with acetate of lead, and gallic acid.

In *Mucous Discharges*, opium is often of service, especially in diarrhœa; sometimes also in leucorrhœa, &c.; but the condition of the system must be the guide to the administration of the drug in these cases; certain forms of ulcers, of a phagedænic character, or those occurring in very weak subjects, are greatly improved by the influence of this remedy.

In *Urinary Diseases*, to lessen the amount of urine, if excessive, as in diabetes; and to allay the irritability of the bladder, occurring in many affections of the urinary organs, opium is employed with advantage. In diabetes codeine is much used.

In *Chest Affections*, this drug should be used with caution; it often allays the cough; but when the respiratory function is seriously impaired, increased dyspnœa is sometimes produced by it; opium tends to diminish the expectoration, an effect at times desirable, but often injurious.

Opium is used in the form of suppository in painful diseases of the rectum and bladder, and chordee; also as an enema in similar cases. It may be applied to the skin in the form of fomentation, over painfully inflamed joints and other parts; and as a liniment or plaster in neuralgic, rheumatic, or other diseases.

Circumstances influencing the operation of Opium.

Age has great influence; children are much more affected than adults; much more than in proportion to the age; and opium must therefore be given with the greatest care to infants and young subjects.

Certain *individuals* are peculiarly susceptible of the action of opium; and in some, great excitement and restlessness are produced, instead of calmness and sleep.

The presence of *Disease* often gives a resisting power to the influence of this drug, especially when great pain is present. On the other hand, opium should be given with very great caution in chronic renal disease, certain forms of cerebral mischief, and in bronchial and acute pulmonary affections.

Custom or habit has perhaps the most marked influence on its action; by gradually increasing the dose, enormous quantities may be taken without any very evident effect being produced; the want of the drug in such cases is, however, most severely felt. The author knew a young man who took 60 grains of Smyrna opium night and morning, and frequently in addition to this, 1 fluid ounce to 1½ fluid ounce of laudanum during the day. And in 1866 he had a patient, a man about 35 years of age, under his care, who positively asserted that he had taken 72 grains of acetate of morphine in one day, and also that he had swallowed as much as a pint of laudanum: the patient had once been a student of medicine, and no ordinary dose of opium appeared to produce the slightest effect on him.

It must not be forgotten that if the drug is discontinued, and after a time the large dose at once resumed, poisoning may occur.

Dose. Of opium, ½ gr. to 3 gr. or more; of confection of opium, 5 gr. to 20 gr.; of extract of opium, ½ gr. to 2 gr. or more; of liquid extract of opium, 10 min. to 40 min. or more; of tincture of opium (laudanum) 5 min. to 40 min. or more; of ammoniated tincture of opium, ½ fl. drm. to 1 fl. drm.; of wine of opium, 10 min. to 40 min. or more; of aromatic powder of chalk and opium, 10 gr. to 40 gr.; of compound soap pill, 3 gr. to 5 gr.; of compound ipecacuanha powder, 5 gr. to 15 gr.; of compound powder of kino, 5 gr. to 20 gr.; of compound powder of opium, 2 gr. to 5 gr.; of compound tincture of camphor, 15 min. to 1 fl. drm.; of tincture of chloroform and morphine, 5 min. to 10 min.; of pill of lead and opium, 3 gr. to 5 gr.; of opium lozenges, one to six; of hydrochlorate or acetate of morphine, ⅛ gr. to ½ gr.; of solution of acetate of morphine, 10 min. to 60 min.; of solution of hydrochlorate of morphine, 10 min. to 60 min.; of solution of bimeconate of morphine, 5 min. to 40 min.; of morphine lozenges, one to six, of morphine and ipecacuanha lozenges, one to six. Of the hypodermic injection of morphine (administered subcutaneously), 1 min. to 5 min.; of the hypodermic injection of apomorphine (administered subcutaneously), 2 min. to 8 min.; of codeine, ¼ gr. to 2 gr.

Adulteration. Opium often contains many mechanical impurities, as stones, sand, clay, bullets, &c.; it may also be mixed with vegetable extracts of various kinds, sugar and treacle; it may contain much water, and it may have had much of its active matter extracted by water, and subsequently dried; physical examination will throw much light on the value of the drug, but on account of its very varying quality, processes are employed for ascertaining the amount of morphine contained in it, and this is taken as the index to the commercial value of the drug. The process given above may be resorted to with advantage. Good Smyrna opium should yield 10 per cent. of morphine; Egyptian opium about 6 or 7 per cent.; East Indian, from 3 to 8 per cent. or more. (See page 200.)

RHŒADOS PETALA. Red Poppy Petals. The fresh petals of Papaver Rhœas, the Red or Corn Poppy; indigenous; growing in fields and waste places.

Description. The petals are of a rich scarlet colour when fresh, often nearly black at the base. They have the peculiar heavy odour of opium when fresh, but become scentless on drying.

Prop. & Comp. The petals yield to water *red colouring matter*, for which they are chiefly prized; this colour is much darkened by alkalies. They contain no trace of morphine, but an alkaloid, *Rhœadine* ($C_{21}H_{21}NO_6$). (*See* under Opium alkaloids.)

Off. Prep. **Syrupus Rhœados.** *Syrup of Red Poppy.* (Fresh red poppy petals, thirteen ounces; boiling distilled water, one pint, or a sufficiency; sugar, two pounds and a quarter; rectified spirit, two fluid ounces and a half. Add the red poppy petals gradually to the water, heated in a water-bath, frequently stirring; then set the vessel aside, macerate for twelve hours; afterwards press out the liquid. Strain, add the sugar, and dissolve by means of heat. When nearly cold add the spirit, and as much distilled water as may be necessary to make up for the loss in the process, so that the product shall weigh three pounds ten ounces, and have the specific gravity 1·330.)

Therapeutics. The action of red poppy is very slight, but similar to that of opium; the amount of active ingredients is very small, and rather uncertain in quantity. It is chiefly used as a colouring agent.

Dose. Of Syrup of red poppy, from 1 fl. drm upwards.

CRUCIFERÆ, OR BRASSICACEÆ.

SINAPIS ALBÆ SEMINA. White Mustard Seeds. The dried ripe seeds of Brassica Alba (Sinapis Alba), from plants cultivated in Britain.

SINAPIS NIGRÆ SEMINA. Black Mustard Seeds. The dried ripe seeds of Brassica Nigra (Sinapis nigra), from plants cultivated in Britain.

SINAPIS. Mustard. Black Mustard seeds and White Mustard seeds, powdered and mixed.

OLEUM SINAPIS. Oil of Mustard. The oil distilled with water from the seeds of Black Mustard, after the expression of the fixed oil.

Description. White mustard seeds are about $\frac{1}{12}$ in. in diameter, and yellow both on the surface and internally; black mustard seeds are scarcely half the size of the former, round, wrinkled, and brownish-black on the surface, yellow within.

Mustard is too well known to need description.

The volatile oil from black mustard is colourless or pale yellow.

Prop. & Comp. When dry, mustard seeds and mustard have little or no odour, but an acrid bitterish oily pungent taste, and give off, when moist, a peculiar pungent smell, very irritating to the eyes and nostrils. Both seeds contain a *fixed oil*, from 25 to 30 per cent. Black mustard contains no *volatile oil* ready formed, but a principle named *myronic acid*, united with potassium, constituting about $\frac{1}{5}$ per cent.; which by the action of an albuminous matter, also contained in the seed, and termed *myrosine*, breaks up, in the presence of water, at 120° F. (48°·88 C.), into the volatile oil of mustard, glucose, and hydropotassic sulphate, with some free sulphur and an insoluble organic substance, derived probably from the myrosine. The *volatile oil of mustard* is of sp. gr. 1·015 to 1·020; very pungent and acrid; has the properties and composition of sulphocyanate of Allyl (C_3H_5, CN, S). It dissolves in alcohol and ether, slightly in water. Applied to the skin it produces almost instant vesication. White mustard does not yield the volatile oil, but contains a crystallisable compound, *sulpho-sinapisin*, which gives rise to an acrid but not volatile principle, containing sulphur. A decoction of mustard when cooled should not be made blue by tincture of iodine, indicating the absence of starch.

Off. Prep. Of the Seeds. **Cataplasma Sinapis.** *Mustard Poultice.* (Boiling water, ten fluid ounces; linseed meal, powdered mustard, of each two ounces and a half. Mix the mustard with two or three ounces of lukewarm water; mix the linseed meal with six to eight ounces of boiling water; add the former to the latter, and stir them together.) Too hot water, or alcohol, or vinegar are apt to injure the production of the volatile oil.

Charta Sinapis. *Mustard Paper.* (Mustard, in powder, one ounce; solution of gutta percha, two fluid ounces; or a sufficiency. Mix the mustard with the gutta percha solution so as to form a semi-fluid mixture; then pass strips of cartridge paper over its surface, so that one side of the paper shall be thinly coated with it. Dry the sheets by exposure to the air.) Before applying this paper to the skin, it should be dipped for a few seconds into tepid water.

Of the Oil. **Linimentum Sinapis Compositum.** *Compound Liniment of Mustard.* (Oil of mustard, a fluid drachm; ethereal extract of mezereon, forty grains; camphor, a hundred and twenty grains; castor oil, five fluid drachms; rectified spirit, four fluid ounces.)

Therapeutics. Mustard, both seeds and flour, act as powerful stimulants. Internally, in large doses, mustard causes speedy vomiting (useful in narcotic poisoning); in smaller doses, as a condiment, it assists digestion. The entire seed was formerly used, and now and then caused ill effects, from accumulating in the intestines. Externally, in the form of the mustard cataplasm, it acts as a powerful rubefacient and vesicant, and its application is useful to relieve slight inflammations of serous and mucous surfaces when applied to a neighbouring part; as for example, upon the chest in bronchitis and pleurisy; also to relieve congestion of various organs by drawing blood to the surface, as in head affections; and likewise for the alleviation of neuralgic and other pains and spasms. Mustard is frequently added to local baths, as the foot bath.

The volatile oil (Oleum Sinapis of the Pharmacopœia) is a very useful local application; the author has long used it combined with spirits of camphor, in the proportion of ten minims to the fluid ounce, lightly sprinkled on impermeable piline, as an elegant substitute for a mustard plaster, or sometimes combined with the belladonna liniment. The oil may also be employed in the form of the compound liniment of mustard. Mustard Paper may also be used as a convenient substitute for the poultice.

Dose. As an emetic, from one teaspoonful to a tablespoonful of mustard mixed with a little water.

Adulteration. Mustard is extensively mixed with common flour, pepper, chilies, turmeric, &c.

ARMORACIÆ RADIX. Horseradish Root. The fresh root of Cochlearia Armoracia. Cultivated in Britain. Common throughout Europe.

Description. A long, tap-shaped cylindrical root, half an inch to an inch in diameter, expanding at the crown into several very small stems; internally white. When cut it has an odour, but probably when uncut it contains no volatile oil.

Prop. & Comp. When scraped, it emits a very pungent odour, and has an acrid taste, depending on a *volatile oil* (C_3H_5,CN,S) identical with oil of mustard; probably the oil is formed as in the black mustard seed.

Off. Prep. **Spiritus Armoraciæ Compositus.** *Compound Spirit of Horseradish.* (Horseradish scraped, dried orange peel, each twenty ounces; bruised nutmeg, half an ounce; proof spirit, a gallon; water, three pints. Mix; let a gallon distil with a moderate heat.)

Therapeutics. The same as mustard; seldom employed in the fresh state except as a condiment. The official preparation is used in atonic dyspepsia; also as a sudorific in chronic rheumatism; and as a diuretic in dropsies. As a syrup it has been slowly swallowed in hoarseness; an infusion is also occasionally prescribed for the same purpose, or the root may be masticated, and the saliva slowly swallowed. The more finely horseradish is scraped, the more pungent it becomes.

Dose. Of the spirit, 1 fl. drm. to 2 fl. drm.

POLYGALACEÆ.

SENEGÆ RADIX. Senega Root; the root of Polygala Senega: a small plant growing in the United States of America.

Description. A knotty head with at its upper part the remains of numerous small stems, and tapering below into a more or less twisted, or curved, branched, and usually keeled root, from $\frac{1}{5}$ to $\frac{1}{3}$ in. thick. Cortical portion is greyish-yellow, the interior or central portion is woody, tasteless, and inert.

Prop. & Comp. The taste of the bark is at first sweetish, and then acrid to the fauces, and increases the flow of saliva; it contains a glucoside called *senegin* or *polygalic* acid, probably identical with *Saponin*, $C_{32}H_{54}O_{18}$, derived from Saponaria officinalis, which breaks up, on being boiled with dilute acids, into sapogenin and glucose. ($C_{32}H_{54}O_{18} + 2H_2O = C_{14}H_{22}O_2 + 3C_6H_{12}O_6$.) It is an acrid white powder, causing sneezing when applied to the nostrils; its aqueous solution, when shaken, froths like a soap solution; it is said to cause local anæsthesia, by paralysing the sensory nerve ends, when topically applied to the skin. Senega root also contains tannin, pectin, gum, &c. The active part of the root is the cortex.

Off. Prep. **Infusum Senegæ.** *Infusion of Senega.* (Senega, bruised, half an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Senegæ. *Tincture of Senega.* (Senega, bruised, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Senega root is a stimulant to the mucous membranes, acting especially on the bronchial tubes; it also acts upon the skin as a stimulating diaphoretic; and at times its diuretic powers are well marked. The uterus appears to be influenced by its administration, and it is therefore termed an emmenagogue. It is used in the treatment of chest affections, as chronic pneumonia and asthenic and chronic forms of bronchitis; sometimes in croup and whooping-cough. Senega has also been found useful in dysmenorrhœa, apparently from its action upon the mucous lining of the uterus. As a diuretic, it is employed chiefly in dropsy depending on kidney disease and accompanied with albuminuria. It is stated that under the influence of senega the pulsations of the heart are rendered less frequent, and that it is useful in heart disease attended with weak and dilated cavities: probably acting in the same way as digitalis. Senega is often advantageously combined with carbonate of ammonium, and with other expectorants and diuretics.

Dose. Of the powder, 20 gr. to 60 gr.; of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture, $\frac{1}{2}$ fl. drm. to 2 fl. drm.

Adulteration. Ginseng, or root of Panax quinquefolium, also Gillenia, both detected by absence of the line running along the true senega root.

KRAMERIÆ RADIX. Rhatany Root; the dried root of (1) Peruvian Rhatany, Krameria triandra; or of (2) Savanilla Rhatany, Krameria Ixina (Krameria tomentosa), growing in New Granada and Brazil.

Description. *Peruvian Rhatany* is in branched or unbranched pieces, varying in length and thickness. The bark, which is readily separable, is $\frac{1}{20}$ to $\frac{1}{10}$ in. thick, rough and scaly, except in the smaller pieces, dark reddish-brown externally, and bright brownish-red on its inner surface. *Savanilla Rhatany* is less irregular and knotty, and not so long nor so thick as the former. Characterised by dark purplish or violet colour, and by its smooth and thicker bark which adheres firmly to the wood beneath, and usually presents deep transverse cracks.

Prop. & Comp. The bark of both kinds of rhatany has no marked odour, but a sweetish astringent taste, tinging the saliva very red. It contains *krameric acid*, of which little is known, about 40 per cent. of *tannin*, and a red astringent matter, both of which are soluble in water and alcohol.

Off. Prep. **Extractum Krameriæ.** *Extract of Rhatany.* (Rhatany, in coarse powder, one pound; distilled water, a sufficiency. Prepared by maceration, percolation, and subsequent evaporation.)

Infusum Krameriæ. *Infusion of Rhatany.* (Rhatany, half an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Krameriæ. *Tincture of Rhatany.* (Rhatany, bruised, two ounces and a half; proof spirit, one pint. Prepared by maceration and percolation.)

Krameria is also contained in pulvis catechu compositus.

Therapeutics. A powerful astringent; it may be employed whenever tannin is indicated; it is useful in chronic forms of diarrhœa and dysentery, and may be given in the various forms of hæmorrhage. The powder has had much repute as a dentifrice when the gums are bleeding or spongy. It may also be used as a gargle or injection in relaxed sore throat, leucorrhœa, and prolapsus ani, in the form of the infusion or diluted tincture.

Dose. Of the powder, 20 gr. to 60 gr.: of the extract, 5 gr. to 20 gr.; of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture, ½ fl. drm. to 2 fl. drm.

LINACEÆ.

LINI SEMINA. The dried ripe seeds of Linum usitatissimum, common Linseed or flax; an indigenous plant.

LINI FARINA. Linseed Meal.

OLEUM LINI. Linseed Oil.

Description. The *seed* is small, oval, oblong, and flattened, pointed at one end; dark brown and shining on the surface, and white within. The *flour* or linseed meal, consists of the seeds ground and deprived of their oil by expression, and the cake reduced to powder. The *oil* is of a light yellow colour, similar in appearance to most other vegetable oils.

Prop. & Comp. The seeds contain a *fixed oil,* about 20 per cent., and *mucilage,* together with the ordinary constituents of seeds: the oil is found in the kernel; the mucilage in the envelope or testa of the seed. After the expression of the oil, the marc which remains is called linseed or oil-cake; and when powdered, linseed meal. The fixed oil, sp. gr. 0·93, rapidly absorbs oxygen from the air and forms a varnish, hence it is called a drying oil; it contains palmitin (perhaps stearin) with a glyceride of linoleic acid ($C_{16}H_{28}O_2$), the latter in much greater quantity.

Off. Prep. Of the Meal. **Cataplasma Lini.** *Linseed Poultice.* (Boiling water, ten fluid ounces; linseed meal, four ounces. Mix the linseed meal with the water gradually, constantly stirring.)

Also contained in the poultices of charcoal, conium, mustard and chlorine (cataplasma sodæ chlorinatæ).

Of the Seed. **Infusum Lini.** *Infusion of Linseed.* (Linseed, one hundred and fifty grains; dried liquorice root, in powder, fifty grains; boiling distilled water, ten fluid ounces.) The seeds are used without being crushed, as the mucilage is contained in the covering.

Therapeutics. Internally, when given in the form of the infusion, linseed is demulcent, from the mucilage and the little oil contained in it, and has been employed in catarrhal and urinary affections; also in diarrhœa and dysentery. Externally, in the form of the poultice, linseed is used to inflamed and suppurating parts. The oil is a useful emollient to burns or scalds, either alone, or mixed with lime-water; Carron-oil is made with it in place of olive oil, as in the Linimentum Calcis of the Pharmacopœia.

Dose. The infusion may be taken *ad libitum.*

MALVACEÆ.

GOSSYPIUM. Cotton Wool. A filamentous substance attached to the seeds of Gossypium Barbadense and other species of this genus, from which fatty matter and all foreign impurities have been removed.

Description. Cotton consists of fine filaments or tubular hairs, becoming flattened by drying, which were attached to the seed-coat; the tubes have but few joints when examined by the microscope; cotton can be distinguished from linen by the fibres of the latter having tapering ends, and being aggregated in bundles. It should be readily wetted by water, to which it should give neither an acid nor an alkaline reaction. In composition it resembles cellulose ($C_{12}H_{20}O_{10}$). It is used for the preparation of pyroxylin, gun cotton.

Use. Cotton Wool is used as an application to burns and scalds, diminishing the inflammation, and aiding recovery probably by protecting the surface : it is occasionally used in erysipelas. Cotton is also usefully employed to surround joints inflamed with gout ; it should then be completely covered with oilskin or gutta percha tissue, so as to keep the affected parts in a kind of vapour bath.

PYROXYLIN. Gun Cotton.

Prep. By immersing an ounce of cotton in five fluid ounces of sulphuric, and the same amount of nitric acid, for three minutes, and afterwards well washing, and drying in a water bath.

Prop. & Comp. It is readily soluble in a mixture of ether and rectified spirit, and leaves no residue when exploded by heat. It resembles cellulose in composition, with a certain number of equivalents of hydrogen replaced by peroxide of nitrogen $C_{12}H_{14}(NO_2)_6O_{10}$. It is used in the Pharmacopœia for the preparation of Collodion.

COLLODIUM. Collodion.

Prep. Pyroxylin, one ounce ; ether, thirty-six fluid ounces ; rectified spirit, twelve fluid ounces. Dissolve the pyroxylin in the ether, mixed previously with the rectified spirit.

Prop. A colourless highly inflammable liquid with ethereal odour, which dries rapidly upon exposure to the air, and leaves a thin transparent film, insoluble in water and rectified spirit.

COLLODIUM FLEXILE. Flexible Collodion.

Prep. Collodion, twelve fluid ounces ; Canada balsam, half an ounce ; castor-oil, a quarter of an ounce. Mix and keep in a well-corked bottle.

Use. Collodion, when applied to the skin, leaves on the evaporation of the ether, a thin transparent layer, and may be used to cut and inflamed surfaces, in skin diseases, as small-pox, and chapped nipples ; to arrest hæmorrhage from leech bites, &c. ; in some of these cases it acts by forming a protecting surface ; in others, from the contraction of the film constricting the vessels of the injured part. For surgical purposes the flexible collodion is the more useful, as it does not crack.

COLLODIUM VESICANS. Blistering Collodion.

Prep. Blistering liquid (liquor epispasticus), twenty fluid ounces; pyroxylin, one ounce. Shaken together until the latter is dissolved.

Use. This preparation has two special advantages over most other blistering agents, it evaporates rapidly, and its action is limited to the part to which it is applied.

AURANTIACEÆ.

AURANTII FRUCTUS. The ripe fruit of Citrus Vulgaris (Citrus Bigaradia), the Seville or bitter orange tree; growing in southern Europe, Spain, &c.

AURANTII CORTEX. Bitter Orange Peel. The external rind of the bitter orange, dried.

AQUA AURANTII FLORIS. Orange Flower Water. Water distilled from the flower of Citrus Vulgaris (Citrus Bigaradia), and Citrus Aurantium, the sweet orange tree, prepared mostly in France.

Description. The cortex or rind is well known; it has an aromatic bitter taste and fragrant odour; the interior white portion should be removed. Aqua Floris Aurantii has the grateful odour of the orange blossoms.

Prop. & Comp. The cortex or rind contains a *volatile oil,* isomeric with oil of turpentine ($C_{10}H_{16}$), a *bitter extractive* (hesperidin), and a little *gallic acid.* Aqua Floris Aurantii contains a little *volatile oil* (oil of Neroli), differing from that contained in the cortex. The water should be colourless, or with a slight greenish-yellow tint, and with a fragrant odour. It should not be coloured by sulphuretted hydrogen.

Off. Prep. Of the Peel:—

Infusum Aurantii. *Infusion of Orange Peel.* (Bitter orange peel, half an ounce; boiling distilled water, ten fluid ounces.)

Infusum Aurantii Compositum. *Compound Infusion of Orange Peel.* (Bitter orange peel, a quarter of an ounce; fresh lemon peel, fifty-six grains; cloves, twenty-eight grains; boiling water, ten fluid ounces.)

Syrupus Aurantii. *Syrup of Orange Peel.* (Tincture of orange peel, one fluid ounce; syrup, seven fluid ounces.)

Tinctura Aurantii. *Tincture of Orange Peel.* (Bitter orange peel, cut small and bruised, two ounces; proof spirit, one pint. Prepared by maceration and percolation.)

Tinctura Aurantii Recentis. *Tincture of Fresh Orange Peel.* (Fresh peel of the bitter orange, six ounces; rectified spirit, one pint. Prepared by maceration and expression.) The flavour of this tincture is stronger and more agreeable than that of the tincture prepared with the dried rind.

Vinum Aurantii. See p. 156.

Of the Orange Flower Water:—

Syrupus Aurantii Floris. *Syrup of Orange Flower Water.* (Orange flower water, eight fluid ounces; refined sugar, three pounds; distilled water, sixteen fluid ounces, or a sufficiency to make the product four pounds and a half. The sp. gr. should be 1·33.)

Orange peel is contained in compound infusion and compound tincture of gentian, in compound spirit of horseradish, and in the compound tincture of cinchona.

Therapeutics. The rind is an aromatic bitter stomachic, a pleasant adjunct to other bitters in the treatment of dyspepsia; it covers, to some extent, the taste of quinine. Aqua Aurantii Floris, and Syrupus Aurantii Floris, are only used as vehicles, and to give flavour to other medicines. Orange wine is used in making the wine of citrate of iron, and quinine wine.

Dose. Of infusion of orange peel, 1 fl. oz. to 2 fl. oz.; of compound infusion of orange peel, 1 fl. oz. to 2 fl. oz.; of the tinctures of orange peel, 1 fl. drm. to 2 fl. drm.; of syrup of orange peel, 1 fl. drm. to 2 fl. drm.; of orange flower water, 1 fl. oz. to 2 fl. oz.; of syrup of orange flower water, 1 fl. drm. to 2 fl. drm.

Adulteration. Orange flower water may contain lead, derived from the vessels in which it is imported; this can be detected by passing sulphuretted hydrogen through it; when free from metallic impurity it is not discoloured.

LIMONIS CORTEX. Lemon Peel. The fresh outer part of the rind of the fruit of Citrus Limonum, the Lemon tree. Lemons are imported from Southern Europe.

OLEUM LIMONIS. Oil of Lemons. The oil expressed or distilled from the fresh lemon peel; imported chiefly from Sicily.

LIMONIS SUCCUS. Lemon Juice. The expressed juice of the ripe fruit of Citrus Limonum.

Description. The *rind*, familiar to all, should have the interior white portion removed; it occurs in thin slices of a yellow colour dotted with numerous vesicles of oil, with a fragrant odour and aromatic, slightly bitter, taste.

The *volatile oil* is obtained by mechanical means from the fresh peel, sometimes by distillation ; it is of a pale yellow colour, with the odour and taste of the peel : the oil obtained by distillation is purer, but less pleasant in flavour.

The *juice*, made by pressing the fruit and straining, forms a slightly turbid, almost colourless mucilaginous acid liquid, possessing a sharp acid taste and agreeable odour.

Prop. & Comp. The rind contains the *volatile oil*, a *bitter extractive*, and a little *gallic acid ;* also a principle, *Hesperidin*, which crystallises in fine white needles.

The volatile oil, *Limonis Oleum*, sp. gr. 0·85, consists of two isomeric oils (as is the case with most volatile oils). Composition, $(C_{10}H_{16})$.

The juice, *Limonis Succus*, sp. gr. 1·035 to 1·045 contains *citric acid* $(H_3C_6H_5O_7,H_2O)$, described under acids, in the inorganic part of the book, and *mucilage*, with small quantities of malic acid, acid salts, especially those of potassium, and sugar. Each ounce of lemon juice contains about thirty-six to forty-six grains of citric acid.

Off. Prep. Of the Peel. **Syrupus Limonis.** *Syrup of Lemons.* (Fresh lemon peel, two ounces ; lemon juice, strained, twenty fluid ounces ; sugar, two pounds and a quarter.) The product should weigh three pounds and a half, and should have sp. gr. 1·34.

Tinctura Limonis. *Tincture of Lemon Peel.* (Fresh lemon peel, sliced thin, two ounces and a half ; proof spirit, one pint. Prepared by maceration and percolation.)

Lemon peel is contained in compound infusion of orange peel, and compound infusion of gentian.

Oil of lemons is contained in aromatic spirits of ammonia.

Lemon juice is contained in syrup of lemons.

Therapeutics. The peel is an aromatic stomachic ; the volatile oil a stimulant and carminative when given internally, and stimulant and rubefacient externally applied ; the juice is refrigerant, resembling a solution of citric acid, and may be used for making effervescing draughts, in lieu of that acid. It possesses some powers besides, which render it antiscorbutic, whereas citric acid is not ; the author attributes this power to the potassium salts contained in it. Lemon juice has been proposed as a remedy in rheumatism, but as yet there is no good clinical evidence proving its value in this disease. Many patients with acute rheumatism recover pretty rapidly when taking lemon juice, but many get well equally soon when taking coloured water.

Dose. Of the syrup, 1 fl. drm. to 2 fl. drm. or more; of the tincture, 1 fl. drm. to 2 fl. drm.; of the oil, 1 min. to 4 min.; of the juice, 1 fl. drm. to 4 fl. drm. or more.

Adulteration. Oil of lemons is liable to admixture with oil of turpentine, difficult to detect except when in large quantities.

Lemon juice is frequently mixed with lime juice, which has the same properties; and that used in the navy has a tenth part of brandy added to it to prevent decomposition. A mixture of sugar and water, acidulated with sulphuric acid, has been substituted for lemon juice.

BELÆ FRUCTUS.

Bael Fruit. The half ripe fruit, dried, of Ægle Marmelos. From Malabar and Coromandel.

Description. A round fruit about the size of a large orange, with a hard rind of a woody consistence. It is usually met with in more or less twisted dried slices or fragments, consisting of the rind, with some adherent dried pulp and seeds; the rind is about a line and a half thick, externally covered with a smooth greyish epidermis, and internally brownish orange or red. The moistened pulp is mucilaginous.

Prop. & Comp. It has no odour, and its taste is simply mucilaginous and very slightly acid. The chemical composition of bael has not been accurately determined; it contains some astringent principle, probably more or less allied to tannic acid.

Off. Prep. **Extractum Belæ Liquidum.** *Liquid Extract of Bael.* (Made by exhausting one pound of bael by repeated macerations in twelve pints of water, evaporating the solution to thirteen fluid ounces, and then adding three fluid ounces of rectified spirit.)

Each fluid ounce of the extract represents about one ounce of bael.

Therapeutics. Indian bael has obtained much reputation in India in the treatment of diarrhœa and dysentery. From the author's experience of its powers in chronic diarrhœa, he is not disposed to consider it superior to some other vegetable astringents. The fruit, when ripe, yields a pulp which can be made into a jelly, and acts as a mild aperient.

Dose. Of the liquid extract of bael, 1 fl. drm. to 2 fl. drm.

BYTTNERIACEÆ.

OLEUM THEOBROMATIS. Oil of Theobroma.

Prep. A concrete oil obtained by expression and heat from the ground seeds of Theobroma Cacao; a tree growing in the West Indies and South America.

Synonym. Cacao Butter.

Description. The oil has the consistency of tallow, is of a yellowish colour, and odour like chocolate, with a bland and agreeable taste; it breaks with a clean fracture, presenting no appearance of foreign matter; does not become rancid from exposure to the air.

Prop. & Comp. Oil of theobroma melts at between 86° and 95° F. (30° and 35° C.); it is insoluble in water, soluble in alcohol, ether, and oil of turpentine. It is composed chiefly of stearin, with a little olein, and forms about fifty-two per cent. of good shelled cacao beans.

Use. Cacao butter is introduced into the Pharmacopœia on account of its physical properties, and is used in the formation of most of the suppositories.

SAPINDACEÆ.

GUARANA. Guarana. A dried paste prepared from the powdered seeds of Paullinia Sorbilis, from Brazil. (Not official.) Known also as Brazilian cocoa.

Description. The dried seeds, after being slightly roasted, are powdered, and made into a stiff paste with water. With this paste a certain proportion of the whole and broken seeds is mingled; the mass is then moulded into cylindrical rolls, not unlike sausages; colour dark reddish-brown; fracture uneven, showing fragments of seeds, with a black outer covering. An infusion of this product is drunk like coffee or chocolate in South America.

Prop. & Comp. Guarana has a slight odour, somewhat like chocolate, a bitter and astringent taste; it is partly soluble in water and in alcohol. It owes its therapeutic value to the *guaranine* or *caffeine*, of which it contains a larger proportion (5 per cent.) than either tea or coffee. (*See* Thea.) *Tannic acid*, *starch*, and *gum*, are also present.

Therapeutics. It has been recommended by Dr. Wilks and others as a remedy for migraine or sick headache. It probably acts in much the same way as strong tea. One or two doses will frequently ward off a threatened attack in persons liable to recurrent paroxysms of the disorder; but its action is somewhat uncertain. It has also been employed against diarrhœa and dysentery, on account of its astringent properties.

Dose. Of guarana 15 to 30 gr., or more, in powder or infusion, taken when the attack is expected, and repeated, if necessary, in two hours. An extract may be made by exhausting the powder with alcohol and evaporating; the dose of the extract is the same as that of the powder.

ERYTHROXYLACEÆ.

COCA. Coca. The dried leaves of Erythroxylon Coca, native of South America.

COCAINÆ HYDROCHLORAS. Hydrochlorate of Cocaine. $\mathbf{C_{17}H_{21}NO_4,HCl}$. The hydrochlorate of an alkaloid obtained from the leaves of Erythroxylon Coca.

Description. The leaves are shortly stalked, oval or lanceolate, entire, usually blunt and emarginate, 1—2 inches in length; midrib prominent, with a curved line on each side of it extending from base to apex. Green above, somewhat paler beneath. The leaves in commercial specimens are often broken and yellowish-brown. The dried leaves are mixed with lime and chewed by the natives of Peru.

Prop. & Comp. The leaves have a faint tea-like odour, especially when bruised; taste somewhat bitter and aromatic. They contain an alkaloid, *cocaine* ($\mathbf{C_{17}H_{21}NO_4}$) in combination with a variety of tannic acid.

The *Hydrochlorate of Cocaine* may be obtained from an acidulated alcoholic extract by rendering it alkaline with carbonate of sodium, and agitating it with ether, then separating and evaporating the ethereal liquid, purifying the product by repeating the treatment with acidulated water, carbonate of sodium and ether; decolorising; neutralising with hydrochloric acid and recrystallising. Thus obtained the hydrochlorate of cocaine is in almost colourless acicular crystals or crystalline powder, readily soluble in water, alcohol and ether. Its solution in water has a bitter taste, and gives a yellow precipitate with chloride of gold; and a white precipitate with carbonate of ammonium, soluble in excess of the reagent. Heated with strong hydrochloric acid it is resolved into a new alkaloid, ecgonine, together with benzoic acid and methyl alcohol. In cold concentrated acids hydrochlorate of cocaine dissolves without colour, but it chars with hot sulphuric acid. The solution yields little or no cloudiness with chloride of barium or oxalate of ammonium.

Off. Prep. **Extractum Cocæ Liquidum.** *Liquid Extract of Coca.* (Coca, in fine powder, twenty ounces; proof spirit, a sufficiency to make up the volume to one pint, after maceration, percolation and evaporation to a soft consistence.)

Lamellæ Cocainæ. *Discs of Cocaine.* (Discs of gelatine, with some glycerine, each weighing about one-fiftieth grain, and containing one two-hundredth of a grain of hydrochlorate of cocaine.)

Therapeutics. The leaves when chewed, are said to exert a powerfully restorative, stimulant, and perhaps narcotic effect. The South American Indians can endure fatigue for days together without food, if furnished with coca. The alkaloid, cocaine, is said to raise the temperature, quicken the pulse, and render the respiration more frequent. The blood pressure first rises and then falls, when cocaine is being administered internally.

Recently the salts of cocaine have been employed for their powerful local anæsthetic properties. A solution of the hydrochlorate produces on the tongue a tingling sensation followed by numbness. In the eye it causes rapid complete insensibility of the conjunctiva, followed by dilatation of the pupil and loss of accommodation. Its effects appear to be due to stimulation of the peripheral ends of the sympathetic nerves. Similar local anæsthesia may be produced by the application of strong solutions (20 per cent.) to mucous surfaces, or by the subcutaneous injection of a 4 per cent. solution, hence the drug is most valuable in allaying pain during the performance of ophthalmic and minor operations. The lamellæ are intended to be placed on the conjunctiva.

Coca is now often given in the form of wine, and in old people this preparation gives increased powers to the nervous system.

Dose. Of coca, ½ drm. to 2 drm.; of the liquid extract, ½ fl. drm. to 2 fl. drm.; of the hydrochlorate, ⅕ gr. to 1 gr.

CAMELLIACEÆ.

THEA. Tea. The dried leaves of Camellia Thea. Cultivated in China, Assam, &c. (Not official.)

Description. The appearance of tea-leaves is well known. The black and green varieties were at one time believed to be derived from distinct species; it appears, however that the differences between them are due solely to the mode of preparation. Green tea is made by rapidly drying the leaves, while the black teas consist of leaves which have undergone a process of fermentation.

Prop. & Comp. Tea-leaves contain an alkaloid, *theine* or *caffeine*, together with *tannin* and a *volatile oil.* Tea contains from one to four per cent. of the alkaloid.

Therapeutics. The effects of tea and coffee on the human subject are not quite the same; the differences between them indicate that their action is not due exclusively to the caffeine which they contain. Their dietetic value used to be ascribed to their power of checking tissue-metamorphosis and so reducing the amount of nitrogenous nutriment required by the organism. The truth of this explanation is doubtful.

Tea and its active principle have been employed medicinally in the treatment of migraine and some intermittent affections; as stimulants in opium coma and the adynamic fevers; in asthma, whooping-cough, and other spasmodic disorders. Green tea is more powerful in its effect on the nervous system than the black varieties; it may cause vertigo, great restlessness, and muscular trembling. (*See* Caffeine.)

CAFFEINA. Caffeine. $\mathbf{C_8H_{10}N_4O_2,H_2O}$. An alkaloid usually obtained from the dried leaves of Camellia Thea, or the dried seeds of Coffea Arabica. (Nat. Ord. Cinchonaceæ.)

Synonyms. Caffeina, Theina, Guaranina.

Prep. From aqueous infusions of the above by evaporation after the removal of astringent and colouring matters.

Prop. & Comp. When pure, caffeine forms beautiful silky prisms, colourless, inodorous; soluble in eighty parts of cold water, giving a faintly bitter and neutral solution; more soluble in boiling water, rectified spirit, and ether. Entirely volatilised by heat. On being evaporated to dryness after being treated with a crystal of chlorate of potassium and a few drops of hydrochloric acid, a reddish residue remains, and is changed to purple by the addition of ammonia. Caffeine is precipitated from aqueous solutions by tannic acid. This alkaloid is also present in guarana (*q.v.*), and in maté or Paraguay tea (the leaves of Ilex Paraguayensis). It is allied to *theobromine*, the active principle of Theobroma Cacao.

Off. Prep. **Caffeinæ Citras.** *Citrate of Caffeine.* (Caffeine, one ounce; citric acid, one ounce; distilled water, two ounces. The caffeine is dissolved in a solution of citric acid, and the mixture evaporated and reduced to a fine powder.) This is a weak compound of caffeine and citric acid, readily separating into its constituents ($C_8H_{10}N_4O_2$, $H_3C_6H_5O_7$). It has a faintly bitter acid taste and an acid reaction. Soluble in a mixture of two parts of chloroform and one of rectified spirit. It is decomposed into citric acid and caffeine on the addition of water, the caffeine first precipitating, and then redissolving on the addition of more water. An aqueous solution gives the tests for caffeine mentioned above, and also the tests for citric acid.

Therapeutics. The experiments of Bennett and McKendrick on animals have led them to conclude that caffeine, cocaine, and theobromine are identical in most of their physiological actions. In small doses they give rise to cerebral excitement and partial loss of sensibility. After large ones, the loss of sensibility is complete; tetanic convulsions and death ensue. The sensory nerves and the sensory portion of the spinal cord appear to be paralysed without any interference with the functions of the anterior columns and motor nerves; idio-muscular contractility is unaffected. The cardiac and respiratory movements are first accelerated, then retarded.

Caffeine, and the citrate, cause abundant diuresis in cases of cardiac dropsy, either when given hypodermically or by the mouth. This action is said to be exerted when digitalis and other diuretics have failed, and to result mainly from the influence of the drug upon the circulation; it increases the heart's action, probably through the intrinsic cardiac ganglia; and it also affects the arterial system, increasing the blood pressure. As a diuretic it has failed in dropsical effusions dependent on chronic Bright's disease. It has also the disadvantage of losing its efficacy with custom. It has also been employed in various forms of headache, tic-douloureux, hemicrania, and neuralgia.

From its tendency to produce nausea and vomiting, it should be used in repeated small doses. It possesses no cumulative action.

Dose. Of caffeine 1 gr. to 5 gr.; of the citrate 2 gr. to 10 gr.

GUTTIFERÆ.

CAMBOGIA. Gamboge. The gum resin obtained from Garcinia Hanburii (Garcinia Morella, *var.* pedicellata). Imported from Siam. The Ceylon variety, which is not official, is derived from Hebradendron gambogioides.

Description. The Siam gamboge occurs in pipes or cylinders, streaked externally, from the impression of the bamboo reeds in which the juice is collected; the pipes are from ½ in. to 1½ inch or more in diameter. Gamboge is hard, brittle, breaking with a vitreous fracture, of a bright yellow colour; inferior varieties, in fragments and masses, also come from Siam; and a coarse kind is made in Ceylon.

Prop & Comp. No odour, taste slight at first, afterwards acrid; easily powdered. It consists of about 70 per cent. of a *resin*, which has marked acid properties, *gambogic acid* ($C_{30}H_{35}O$?) together with about 25 per cent. of a *soluble gum*. The resin is soluble in alcohol and ether, and precipitated from these solutions by water; rubbed with water, the gum dissolves, forming a yellow emulsion with the suspended resin.

Off. Prep. **Pilula Cambogiæ Composita.** *Compound Gamboge Pill.* (Gamboge, one ounce; Barbadoes aloes, one ounce; compound powder of cinnamon, one ounce; hard soap, in powder, two ounces; syrup, a sufficiency.)

Therapeutics. Gamboge acts as a drastic and hydragogue purgative, often causing vomiting and griping; it sometimes promotes the action of the kidneys. It is seldom given alone, but combined with cream of tartar, calomel, or some vegetable purgative. It may be used in dropsies as a hydragogue purgative combined with cream of tartar, a combination which causes copious watery evacuations; or with calomel as a derivative in some forms of cerebral disease. It may also be used as an anthelmintic. In all cases some aromatic, as ginger or an aromatic oil, should be added. In large doses, gamboge acts as a powerful irritant to the alimentary canal, at times causing inflammation and death. As a purgative it may be placed between scammony and croton oil or elaterium.

Dose. Of the powder, 1 gr. to 4 gr.; of the compound pill, 5 gr. to 10 gr.

Adulteration. An emulsion made with boiling water does not become green on the addition of iodine, showing the absence of starch, with which it is sometimes adulterated.

CANELLACEÆ.

CANELLÆ CORTEX. Canella Alba Bark. The bark of Canella alba, or Laurel-leaved Canella deprived of its corky layer and dried; growing in the West Indies.

Description. The bark occurs in large quills or flattened pieces about an inch or so in diameter, and of varying length; externally, of a pale orange-brown or buff colour; internally, white or yellowish white: it breaks with a starchy fracture.

Prop. & Comp. Odour spicy; taste warm and bitter. It contains a *resin*, a little *volatile oil*, and *bitter extractive*, besides starch and *mannite sugar;* neither tannic nor gallic acid is present.

Prep. Used in Vinum Rhei. A mixture of equal parts of powdered canella bark and aloes was formerly known by the name of Hiera Picra.

Therapeutics. An aromatic bitter stomachic and tonic; it may be given in cases of atonic dyspepsia. It is now seldom used except in combination, as in rhubarb wine. It has been employed in chronic forms of gout, rheumatism, and secondary syphilis, in the same way as mezereon, sassafras, and other like drugs.

Dose. Of the powder, 15 gr. to 30 gr.

VITACEÆ.

UVÆ. Raisins. The ripe fruit of Vitis vinifera, or the Grape Vine, dried in the sun or with artificial heat: probably a native of Persia, cultivated extensively in different parts of Europe. Imported from Spain.

Prop. & Comp. Raisins contain a considerable amount of *grape sugar* and *acid tartrate of potassium;* it is from the grape that tartaric acid is derived, being obtained from argol, the deposit on the sides of wine-casks.

Off. Prep. Raisins are contained in tinct. cardamomi comp., and tinct. sennæ.

Therapeutics. Slightly refrigerant, but never employed in medicine for any therapeutic property they possess. Used only to sweeten preparations.

VINUM XERICUM. Sherry. Sherry is described under the head of Alcoholic preparations. (See p. 155.)

ZYGOPHYLLACEÆ.

GUAIACI LIGNUM. Guaiacum Wood. Lignum Vitæ. The heart wood of Guaiacum Officinale, the Official Guaiacum Tree; or of Guaiacum Sanctum, natives of St. Domingo and Jamaica; the wood, as imported, should be deprived of its sapwood, and the heart-wood reduced to the form of chips, shavings, or raspings by a turning lathe.

GUAIACI RESINA. Guaiacum Resin. A resin obtained from the stem of Guaiacum Officinale, or of Guaiacum Sanctum, by natural exudation, or by exudation from incisions, or by heat.

Description. Guaiacum *wood* is met with in large logs, and known by the name of *Lignum vitæ*, generally denuded of bark; consisting of the duramen or heart-wood, of a dark greenish-brown colour, and the alburnum of a yellow tint; it is very hard, tough, and heavy; sp. gr. 1·33; the heart-wood contains a large amount of the guaiacum resin, which is dark brown, transparent in very thin layers, brittle, of aromatic odour, and leaves, when tasted, a peculiar burning sensation in the throat; the tears are oval, of varying size, and often covered with a greenish powder on the surface. The *resin* is usually procured by boring a longitudinal hole in the log, and putting one end of it into the fire; the resin melts and exudes at the other end, where it is collected. That obtained by natural exudation is in the form of tears of varying size. The *wood* is commonly sold in chips or raspings for medicinal purposes; these when boiled in salt water yield the resin, which rises to the surface.

Prop. & Comp. The chips, when touched with nitric acid, assume a temporary bluish-green colour; and if moderately heated in a solution of perchloride of mercury, a bluish-green colour is also produced. The most important constituent of the wood is the above-described *resin*, which has a sp. gr. 1·25, is insoluble in water, or yields to that fluid only some extractive matter mixed with it; a solution in rectified spirit strikes a clear blue colour when applied to the inner surface of a paring of raw potato, due to the action of guaiacic acid on the gluten; soluble in alcohol and ether, also in alkaline solutions; precipitated from alcohol by water, and from alkalies by acids; acted on by nitric acid and chlorine, when the colour is first changed to green, then blue, at last brown. The resin contains guaiaretic acid, which is crystalline ($C_{20}H_{20}O_4$), about 10 per cent.; guaiaconic acid ($C_{19}H_{22}O_3$), about 70 per cent.; with other vegetable matter.

Off. Prep.—Of the Resin.

Mistura Guaiaci. *Guaiacum Mixture.* (Powdered guaiacum resin, half an ounce; sugar, half an ounce; gum acacia powdered, a quarter of an ounce; cinnamon water, one pint.)

Tinctura Guaiaci Ammoniata. *Ammoniated Tincture of Guaiacum.* (Guaiacum resin, in fine powder, four ounces; aromatic spirit of ammonia, one pint.)

Guaiacum *resin* also enters into the composition of pilula hydrargyri subchloridi composita.

Guaiacum *wood* forms an ingredient of decoctum sarsæ compositum.

The author for the last eighteen years has used a preparation of Guaiacum and Lithium (Guaiacate of Lithium), in the form of pills, especially in chronic gouty cases; it may be taken for months. Dose, 5 gr.

Therapeutics. Guaiacum resin, when taken internally, often causes heat in the throat, irritation of the intestinal canal, and, in large doses, purging. When absorbed it acts as a stimulant, diaphoretic and alterative, and is by some considered to be an emmenagogue. It is employed in chronic forms of rheumatism, especially that variety called cold rheumatism, in which the symptoms are relieved by warmth; also in chronic gout, periosteal affections connected with a syphilitic taint, and many other affections, as skin diseases, and dysmenorrhœa.

Dose. Of guaiacum resin, 10 gr. to 30 gr.; of the mixture, ½ fl. oz to 2 fl. oz.; of the ammoniated tincture, ½ fl. drm. to 1 fl. drm.

Adulteration. Other resins, as that from coniferous trees, detected by their terebinthinate odour, and solubility in oil of turpentine. A simple tincture of guaiacum, when thrown into water, becomes milky, from the precipitation of the resin: if a solution of potash is now carefully added, it is cleared, and remains so after excess of the alkali, provided guaiacum only be present, but not if other resins are contained in the tincture. The presence of guaiacum resin can be shown by the potato test given above.

RUTACEÆ.

RUTA. Rue. The leaf of Ruta graveolens, or Common Rue; a plant growing throughout Europe. (Not oficial, but giving the following official oil.)

OLEUM RUTÆ. Oil of Rue. Distilled from the fresh herb of Ruta graveolens or common rue.

Description. The leaves are supra-decompound, the leaflets oblong and ovate, glaucous green, fleshy, and dotted. The oil is of a pale yellow colour. When recent, sp. gr. about 0·837.

Prop. & Comp. The leaves owe their properties chiefly to the *volatile oil*, which has a strong, disagreeable odour, and acrid taste, and becomes brown by keeping. The composition of this oil appears to be complex; it is stated to consist chiefly of euodic aldehyde ($C_{11}H_{21}O,H$), mixed with a small amount of lauric aldehyde ($C_{12}H_{24}O$), and a hydrocarbon isomeric with oil of turpentine and borneol. Rue leaves contain, besides this oil, *a bitter extractive* matter, soluble in water.

Therapeutics. Rue, or its oil, acts as a powerful topical stimulant, and has been used in flatulent colic; it also appears to be an antispasmodic and emmenagogue, and seems useful in hysterical affections, and in epilepsy; by some it has been thought anthelmintic. Externally, rue may be used as a rubefacient. Sometimes it is employed in the form of an enema.

Dose. Of oil of rue, 1 min. to 4 min.

BUCHU FOLIA. Buchu Leaves. The dried leaves of Barosma betulina, Barosma crenulata, and Barosma serratifolia; imported from the Cape of Good Hope.

Description. The leaves of all three species are smooth, and marked with pellucid dots (oil glands) at the indentations and apex, and possess a powerful odour and camphoraceous taste.

The leaf of *Barosma betulina* is from half an inch to three-quarters of an inch long, cuneate or rhomboid-obovate, serrate, apex very blunt and usually recurved; texture more cartilaginous than in the other species.

The leaf of *Barosma crenulata* is from three-quarters of an inch to an inch and a quarter long, thickish, oval, oblong, or rhomboid-oval, somewhat blunt at the apex, narrowed at the base into a distinct petiole, finely serrate or crenate-serrate.

The leaf of *Barosma serratifolia*, from an inch to an inch and a half long, linear-lanceolate, tapering at each end, actual apex truncate, sharply and finely serrated, three-nerved; texture thinner than in the other species.

Prop. & Comp. Buchu contains a *volatile oil*, which gives the odour to the leaves, and a *bitter extractive* matter, soluble in water.

Off. Prep. **Infusum Buchu.** *Infusion of Buchu.* (Buchu leaves, half an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Buchu. *Tincture of Buchu.* (Buchu, bruised, two ounces and a half; proof spirit, one pint. Prepared by maceration and percolation.)

Therapeutics. Buchu seems to be a slight tonic and stomachic, but is used chiefly on account of its action on the urinary organs, in chronic catarrh of the bladder, and irritable condition of these parts; it acts, also, as a diuretic, and occasionally as a diaphoretic.

Dose. Of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture, 1 fl. drm. to 2 fl. drm.

CUSPARIÆ CORTEX. Cusparia Bark. The Bark of Galipea Cusparia, Angustura bark tree; from tropical South America.

Description. In flattish or curved pieces, or in quills, several inches in length, about an inch or rather more in breadth, and one-sixth of an inch thick; obliquely cut on its inner edge. Externally it is covered with a yellowish grey, uneven epidermis; internally, light brown, and separable into thin layers. It breaks with a resinous fracture; has a rather peculiar odour, and a very bitter, but aromatic taste; the cut surface, examined with a lens, usually exhibits numerous white points or minute lines. The inner surface touched with nitric acid does not become blood-red.

Prop. & Comp. Cusparia bark contains a trace of *volatile oil*, some *resin*, and a principle, *cusparine*, in tetrahedral crystals, soluble in alcohol, acids, and alkalies. The infusion of cusparia is precipitated by tannin, so also is cusparine.

Off. Prep. **Infusum Cuspariæ.** *Infusion of Cusparia.* (Cusparia bark, in coarse powder, half an ounce; distilled water, at 120° F. (48°·9 C.), ten fluid ounces.)

Therapeutics. An aromatic stomachic, probably with some antiperiodic properties. Used in atonic dyspepsia, diarrhœa, and dysentery, also in convalescence from acute diseases. In South America it has been much employed in the treatment of low malignant fevers, occurring in marshy districts; it is not much prescribed in England, nor have its powers been fully investigated

Dose. Of infusion of cusparia, 1 fl. oz. to 2 fl. oz.

Adulteration. The bark of strychnos nux vomica has been substituted for true cusparia or angustura bark, and hence named false angustura bark; as this substitution has been the cause of fatal accidents, the knowledge of the distinction between the two becomes important. The false bark is usually in shorter pieces, more irregularly twisted, with little or no odour, and much more bitter than the true bark, it breaks with a shorter and more resinous fracture, and is not separable into layers; the epidermis is whitish but spotted red; nitric acid turns the inner surface blood-red, the epidermis greenish or black; applied to the epidermic surface of the true cusparia bark, nitric acid may render it slightly orange-red; applied to the inner surface, it turns it of a bluish-black colour. False cusparia bark yields *brucine* and *strychnine;* the true bark contains neither of these alkaloids.

JABORANDI. Jaborandi. The dried leaflets of Pilocarpus Pennatifolius, imported from Brazil and known there as Jaborandi.

Synonym. Pilocarpi Foliola.

PILOCARPINÆ NITRAS. Nitrate of Pilocarpine. $C_{11}H_{16}N_2O_2HNO_3$. The nitrate of an alkaloid obtained from extract of jaborandi.

Description. The leaves are compound, pinnate, with three to five pairs of leaflets, and a terminal one. Leaflets very shortly stalked, usually four to six inches long, oval-oblong or oblong-lanceolate, somewhat unequal at the base, obtuse emarginate, entire, coriaceous. Upper surface smooth, under surface paler, often somewhat hairy, with prominent mid-rib and full of pellucid dots.

Prop. & Comp. The leaves have a slightly aromatic odour when bruised, taste at first bitter and aromatic, subsequently hot, pungent and increasing the flow of saliva. They contain a liquid alkaloid *pilocarpine*, colourless and odourless; which forms cystallisable salts with acids. The leaves also contain *jaborine*, the salts of which do not crystallise.

The *nitrate of pilocarpine* is obtained from the extract of jaborandi by shaking it with chloroform and a little alkali, evaporating the chloroform solution, neutralising the product with nitric acid and purifying by recystallisation. It forms a white crystalline powder, or acicular crystals; soluble in water, slightly soluble in cold rectified spirit, freely in hot. With strong sulphuric acid it yields a yellowish solution, which gradually acquires an emerald green colour on the addition of bichromate of potassium.

Off. Prep. **Extractum Jaborandi.** *Extract of Jaborandi.* (Jaborandi, in fine powder, one pound; proof spirit and distilled water, of each a sufficiency. Prepared by maceration, percolation, and evaporation.)

Infusum Jaborandi. *Infusion of Jaborandi.* (Jaborandi, cut small, half an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Jaborandi. *Tincture of Jaborandi.* (Jaborandi, in fine powder, five ounces; proof spirit, one pint. Prepared by maceration and percolation.)

Therapeutics. True jaborandi is a powerful diaphoretic and sialagogue. In large doses it causes vomiting. It increases the rapidity of the heart's action, and diminishes arterial tension, causing flushing of the face, ears and neck, followed speedily by profuse perspiration and enormous secretion of saliva; drowsiness and languor ensue. The pupil is contracted, and the power of accommodation impaired. Jaborandi appears to produce its effects by paralysing the vaso-motor nerves. It is rapidly eliminated by the skin and kidneys.

Injurious effects sometimes produced by it are dimness of vision, vomiting, sudden collapse, swelling of the salivary glands and tonsils, diminished secretion of urine, albuminuria and strangury.

Pilocarpine, to which these effects are due, exerts a marked antagonism to atropine.

Jaborine appears to be physiologically identical with atropine, in its action on the heart, lungs, pupils, and salivary glands.

Sudden collapse occurring during the administration of pilocarpine should be treated by subcutaneous injection of atropine.

Jaborandi and its preparations may be employed in ophthalmic practice, more particularly in cases of intraocular hæmorrhage, albuminuric retinitis and detachment of the retina. For their diaphoretic action they may be used in the early stages of coryza, acute bronchitis, &c., but they are mainly of service in dropsy, especially when the result of Bright's disease, the amount of water and of urea eliminated increasing largely under their influence. Jaborandi and pilocarpine are of great value in uræmic convulsions; they have not been so successfully employed in convulsions arising from other causes, having failed to give relief in some cases of puerperal convulsions.

Circumstances influencing the operation of Jaborandi. Children are less affected by this drug than adults, sweating being only occasionally slightly produced, while salivation is mostly absent.

In some cases of fatty degeneration of the heart, valvular disease, and emphysema, the action should be cautiously watched.

Dose. Of the powdered leaves 5 gr. to 60 gr.; of the extract, 2 gr. to 10 gr.; of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture, $\frac{1}{2}$ fl. drm. to 1 fl. drm.; of the nitrate of pilocarpine, $\frac{1}{20}$ gr. to $\frac{1}{2}$ gr.

SIMARUBACEÆ.

QUASSIÆ LIGNUM. Quassia Wood. The chips, shavings or raspings of Picræna excelsa: from Jamaica. This forms Jamaica quassia.

Description. Quassia occurs in cylindrical logs or billets of varying size, seldom thicker than the thigh; externally greyish-brown, internally light yellow. The wood is tough, dense, without odour, but intensely bitter: it is generally sold in chips, shavings, or raspings.

Prop. & Comp. Quassia yields its bitterness to water and spirit; it contains a crystallisable neutral principle, *quassine* ($C_{10}H_{12}O_3$), which possesses the bitterness of the wood; it is devoid of tannin or gallic acid, and may, therefore, be suitably combined with persalts of iron, as it does not become black or bluish-black with them.

Off. Prep. **Extractum Quassiæ.** *Extract of Quassia.* (Prepared by the maceration of the wood in water, percolation, and evaporation to a proper consistence.)

Infusum Quassiæ. *Infusion of Quassia.* (Quassia in chips, fifty-five grains; cold distilled water, ten fluid ounces.) Very liable to become decomposed in warm weather.

Tinctura Quassiæ. *Tincture of Quassia.* (Quassia in chips, three-quarters of an ounce; proof spirit, a pint.)

Therapeutics. Quassia acts as a pure bitter stomachic, devoid of astringency: used in atonic indigestion, such as occurs in asthenic forms of gout, or from alcoholic abuse and other causes. It is sometimes given as a tonic after acute diseases, and has been employed as an antiperiodic in fevers. It probably acts on the nervous system when given in large doses. It is destructive to some of the lower animals, and is employed in the form of enema to destroy threadworms.

Dose. Of the extract, 3 gr. to 5 gr.; of infusion of quassia, 1 fl. oz. to 2 fl. oz.; of tincture of quassia, ½ fl. dr. to 2 fl. dr.

SUB-CLASS II. CALYCIFLORÆ.

RHAMNACEÆ.

RHAMNI FRANGULÆ CORTEX. Frangula Bark. The dried bark of Rhamnus Frangula, the Black Alder, grown in Germany, Holland, and other parts of Europe.

Description. The bark is collected from the young trunk and moderate-sized branches, and kept at least a year before used; it is about $\frac{1}{25}$-inch thick, and consists of small quills, covered with a greyish-brown or blackish-brown corky layer, with white transverse markings; the inner surface is smooth and brownish yellow; fracture short externally, somewhat fibrous within.

Prop. & Comp. The bark has a pleasant, sweetish, and slightly bitter taste, and no marked odour. The most important constituent is *frangulin.*

Off. Prep. **Extractum Rhamni Frangulæ.** *Extract of Rhamnus Frangula.* (Rhamnus frangula bark, in fine powder, one pound; proof spirit and water, of each a sufficiency. Prepared by maceration, percolation, and evaporation.)

Extractum Rhamni Frangulæ Liquidum. *Liquid Extract of Rhamnus Frangula.* (Rhamnus frangula bark, in coarse powder, one pound; rectified spirit, four fluid ounces; distilled water, a sufficiency.)

Therapeutics. In the fresh state the bark acts as an irritant poison, causing vomiting and purging. On drying it acts much less violently, and may be employed as a purgative in chronic constipation.

Dose. Of the extract, 15 gr. to 60 gr.; of the liquid extract, 1 fl. drm. to 4 fl. drm.

RHAMNI PURSHIANI CORTEX. Sacred Bark. (Cascara Sagrada.) The dried bark of Rhamnus Purshianus, obtained from California.

Description. The bark, $\frac{1}{25}$-inch to $\frac{1}{8}$-inch thick, occurs in quills or in curved pieces of varying lengths and sizes, covered externally with a greyish white layer, which is usually easily removed, and frequently marked with spots or patches of adherent lichens. Internally reddish-brown or yellowish-brown. Fracture short, except internally.

Prop. & Comp. Taste bitter; no marked odour. Probably its active principle is similar to that of rhamnus frangula.

Off. Prep. **Extractum Cascaræ Sagradæ.** *Extract of Cascara Sagrada.* (Sacred bark, in fine powder, one pound; proof spirit and distilled water, of each a sufficiency. Prepared by maceration, percolation, and evaporation.)

Extractum Cascaræ Sagradæ Liquidum. *Liquid Extract of Cascara Sagrada.* (Sacred bark, in coarse powder, one pound; rectified spirit, four fluid ounces; distilled water, a sufficiency.)

Therapeutics. This drug possesses tonic purgative properties, and has recently been highly recommended for employment in cases of chronic constipation, especially when occurring with hæmorrhoids. From the author's as yet limited experience, he thinks the Cascara Sagrada a very efficient purgative, often causing the complete emptying of the colon, without producing rectal irritation.

Dose. Of the extract, 2 gr. to 8 gr.; of the liquid extract, ½ fl. drm. to 2 fl. drm. Best administered twice or three times a day, before meals, but then in much smaller doses.

ANACARDIACEÆ.

MASTICHE. Mastich. A concrete resinous exudation obtained by making incisions in the stem and larger branches of Pistacia Lentiscus, native of the countries bordering on the Mediterranean; chiefly imported from Turkey and the Levant.

Description. In its best condition it occurs in small rounded or pear-shaped masses called tears, which are of a light yellow colour, friable, becoming soft and ductile when chewed; the fracture vitreous, shining and transparent; the surface of the tears is often covered with a whitish dust, produced by the rubbing together of several pieces. The larger masses are less pure than the small; they are formed by the agglutination of several tears, and are often mixed with bark and earthy matter. It has a faint agreeable odour, and a mild resinous taste.

Prop. & Comp. It is wholly soluble in ether and chloroform, but scarcely at all so in the fixed oils; it contains a small quantity of volatile oil; alcohol dissolves about nine-tenths of it, consisting of an acid resin (mastichic acid, $C_{20}H_{30}O_2$); the remainder, which is soluble in ether, has been called *Masticine* ($C_{20}H_{31}O$), and is a tenacious resin, with traces of an ethereal oil.

Therapeutics. The action is the same as that of the resin of turpentine; it is but little used. From the agreeable odour which it communicates to the breath, it is sometimes employed as a masticatory. Dissolved in chloroform or ether, it is often used for stopping carious teeth.

Dose. 20 gr. to 40 gr. if administered internally.

RHUS TOXICODENDRON. The leaves of the Rhus Toxicodendron, Poison Oak, or Ivy, or Poisoned Sumach (not official).

Description. The leaves are trifoliate, leaflets entire, or rarely toothed: ovate, deep shining green on the upper surface, hairy on the under.

Prop. & Comp. The leaves contain a peculiar *acrid resin*, and gummy extractive. It is on the presence of the former substance that the properties of the plant depend.

Prep. For topical application a tincture of the leaves is made.

Therapeutics. It is chiefly used as a topical irritant. The juice of the leaves causes inflammation and vesication of the part to which it is applied. Internally administered, it is supposed to act on the spinal system in a manner similar to strychnine; in large doses it causes inflammation of the stomach. It has been recommended in paraplegia and incontinence of urine, and also in rheumatism, but further investigation as to its efficacy is required.

Dose. Of the powder, ½ gr. to 1 gr., gradually increased.

AMYRIDACEÆ.

MYRRHA. Myrrh. A gum-resin obtained from the stem of Balsamodendron Myrrha. It imported from Arabia Felix and Abyssinia.

Description. The best sort is in irregular fragments of varying size; of a reddish-brown or reddish-yellow colour; translucent, but the surface often covered with powder; fractured surface irregular and somewhat oily; of a peculiar aromatic odour, and pungent warm acrid bitter taste. The inferior variety is in much larger masses than the pure, darker coloured, less transparent and contains earthy and other impurities. The former variety is known as Turkey Myrrh, from its having been imported into England from that country; at the present day, myrrh is imported exclusively from the East Indies.

Prop. & Comp. It contains a *volatile oil, gum, resin*, salts, &c. The resin is bitter, soluble in alcohol, but partially only in ether. With water, myrrh forms an emulsion of a milky-white colour, from the suspension of the resin by the gum which is held in solution.

Off. Prep. **Pilula Aloes et Myrrhæ.** *Pill of Aloes and Myrrh.* (Socotrine aloes, two ounces; myrrh, one ounce; saffron, dried, half an ounce; treacle, one ounce; glycerine, a sufficiency.)

Tinctura Myrrhæ. *Tincture of Myrrh.* (Myrrh, in coarse powder, two ounces and a half; rectified spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Myrrh is also contained in mist. ferri c.; pil. asafœtidæ c.; pil. rhei c.; and decoct. aloes c.

Therapeutics. Myrrh acts as a stimulant in a manner not unlike other resinous substances; it increases the secretion of the mucous membranes, especially of the bronchial tubes, and is supposed to possess antispasmodic and emmenagogue properties, combined with tonic powers.

Myrrh is frequently administered in conjunction with iron and aloetic preparations in amenorrhœa; also in leucorrheal and other mucous discharges connected with debility; sometimes as an expectorant in chronic bronchitis and phthisis. Externally, as a topical stimulant, it is applied to aphthous sore mouths, spongy gums, &c.

Dose. Of myrrh, 10 gr. to 30 gr.; of tincture of myrrh, ½ fl. drm. to 1 fl. drm. Of pill of aloes and myrrh, 5 gr. to 10 gr. The tincture is more frequently used externally, mixed with water (2 fl. drm. to 4 fl. oz.), to form a gargle.

Adulteration. Gum bdellium and other gum resins are occasionally met with in samples of myrrh, and an inferior kind is often substituted for good myrrh.

ELEMI. Manila Elemi. A concrete resinous exudation probably from Canarium Commune. Chiefly imported from Manila.

Description. It occurs in masses of various sizes, usually of a soft consistence more or less transparent when fresh, but on keeping, it becomes harder and of a yellowish colour; it has a peculiar fennel-like odour, and a bitter aromatic taste.

Prop. & Comp. The odour is due to the presence of *volatile oil*; the *resin* is soluble in alcohol. Moistened with rectified spirit, it breaks up into small particles, seen, under the microscope, to consist partly of acicular crystals.

Off. Prep. **Unguentum Elemi.** *Ointment of Elemi.* (Elemi, a quarter of an ounce; simple ointment, one ounce.)

Therapeutics. Action like the turpentines generally: chiefly used externally, in the form of ointment, as a topical stimulant. Not given internally.

LEGUMINOSÆ.

PAPILIONACEÆ.

GLYCYRRHIZA. Liquorice root. The root and underground stem or stolon, fresh and dried, of Glycyrrhiza glabra; cultivated in Britain; the fresh root should be kept in dry sand.

Description. In cylindrical branched pieces, brown on the surface and yellow within, about the size of the little finger; tough and pliable; odour earthy and somewhat sickly; sweet and mucilaginous to the taste.

Prop. & Comp. Contains a peculiar sweet brownish substance, *glycyrrhizine* ($C_{24}H_{36}O_9$); not fermentable nor crystalline; soluble in water and spirit; its aqueous solution is precipitated by acids (sulphuric); when boiled with hydrochloric acid, it is resolved into a resinous matter (glycyrretin) and glucose. Liquorice also contains *asparagine*, gum, mucilage, &c.

Off. Prep. **Extractum Glycyrrhizæ.** *Extract of Liquorice.* (Obtained by maceration and percolation of liquorice root with water and subsequent evaporation to a proper consistence.)

Extractum Glycyrrhizæ Liquidum. *Liquid Extract of Liquorice.* (Obtained by macerating the root, in coarse powder, in water. The expressed liquid is heated to 212° F. (100° C.) and strained through flannel. A sixth of its volume of rectified spirit is added, to prevent decomposition.)

Pulvis Glycyrrhizæ Compositus. *Compound Powder of Liquorice.*
Synonym. Pulvis Glycyrrhizæ Compositus cum Sulphure.
(Senna and liquorice root in fine powder, of each, two ounces; fennel fruit, in fine powder, one ounce; sublimed sulphur, one ounce; powdered sugar, six ounces.)

Powdered liquorice root is contained in some pills, and other official preparations; and the extract in compound decoction of aloes and confection of senna, &c.

Therapeutics. A sweet demulcent, useful in allaying cough, to sheathe the mucous membranes, &c., but more frequently employed on account of its sweetness to cover the taste of other medicines. The compound powder is an agreeable form in which to administer senna and sulphur; it is often called German Liquorice Powder.

Dose. Of the extract, 5 gr. to 1 drm.; of the liquid extract, 1 fl. drm.; of the compound powder, 30 gr. to 60 gr.

TRAGACANTHA. Tragacanth. The gummy juice (hardened in the air) exuding from the stem of Astragalus gummifer, and possibly other species; collected in Asia Minor.

Description. In semi-transparent flakes, waved concentrically, rough, and difficult to powder, without odour or taste; rendered more easily pulverisable by a heat of 120° F. (48°·9 C.). Sparingly soluble in cold water, but swelling into a gelatinous mass, which is tinged violet by iodine, indicating the presence of but little starch. After maceration in cold water the fluid portion is not precipitated by the addition of rectified spirit, showing absence of gum acacia.

Prop. & Comp. Forms with water a very thick tenacious mucilage, and contains two distinct gums: *Arabine*, like that contained in gum Arabic, soluble in water, &c., about 53 per cent.; and *Bassorine*, a gum not soluble in water, and therefore suspended only in the mucilage, about 33 per cent.; together with a little starch. By the action of alkalies, it is rendered soluble in water and converted into true gum; the prolonged action of boiling water produces a similar change in the nature of bassorine. Nitric acid converts it into mucic and oxalic acids.

Off. Prep. **Glycerinum Tragacanthæ.** *Glycerine of Tragacanth.* (Tragacanth, one hundred and ten grains; glycerine, one fluid ounce; distilled water, seventy-four fluid grains.) A translucent homogeneous jelly.

Mucilago Tragacanthæ. *Mucilage of Tragacanth.* (Tragacanth, sixty grains; rectified spirit, two fluid drachms; distilled water, ten fluid ounces.)

Pulvis Tragacanthæ Compositus. *Compound Tragacanth Powder.* (Powdered tragacanth, powdered gum acacia and starch, each one ounce; refined powdered sugar, three ounces.)

Therapeutics. Simply demulcent, used as gum Arabic; the mucilage is usefully employed to suspend heavy powders, as subnitrate of bismuth, &c. One part of tragacanth is said to give more viscosity to water than 25 parts of gum Arabic.

Dose. Of simple tragacanth powder, or of the compound powder, 20 gr. to 60 gr.; of the mucilage, 1 fl. oz. upwards.

MUCUNA. Cowhage. (Not official.) The hairs of the fruit of Mucuna pruriens, Cowhage plant; growing in the West Indies.

Description. The legume or pod is shaped like the italic letter *f*, about four inches long and half an inch broad, coriaceous, and covered with numerous stiff, brown, stinging hairs, which have serrations near their points; these are removed, and employed in medicine.

Therapeutics. Cowhage has been used as an anthelmintic, and is supposed to act by its mechanical peculiarities, irritating the entozoa and thus causing their expulsion. The watery or alcoholic solutions of mucuna do not possess the same powers.

Dose. Of an electuary of the hairs made with syrup, honey, or treacle, from a tea-spoonful to a table-spoonful or more, followed after a short time by the administration of some purgative.

SCOPARII CACUMINA. Broom tops. The fresh and dried tops of Cytisus Scoparius (Sarothamnus Scoparius), or Common Broom; indigenous, and growing throughout Europe.

Prop. & Comp. The tops, when fresh, have a peculiar odour, which is lost in drying; the taste is bitter; they contain a neutral principle, *Scoparin* ($C_{21}H_{22}O_{10}$), forming a pale yellow, brittle, amorphous mass, tasteless and inodorous; also *Sparteine* ($C_{15}H_{26}N_2$), a viscid oil, of a pale colour when fresh, but becoming brown on exposure; forming crystalline salts with perchloride of platinum and corrosive sublimate; besides these, extractive matters and salts are found in the tops.

Off. Prep. **Decoctum Scoparii.** *Decoction of Broom.* (Broom tops, dried, an ounce; distilled water, a pint.)

Succus Scoparii. *Juice of Broom.* (Expressed juice of fresh broom tops, three fluid parts; rectified spirit, one fluid part.)

Therapeutics. Broom tops have long been reputed diuretic; the alkaline salts contained in the tops are insufficient to account for their activity, which in some cases of disease is undoubted. Broom tops are especially useful in dropsies depending on cardiac disease. In large doses they cause vomiting and purging.

Experiments on animals have shown that the action of sparteine is analogous to that of conine. It greatly diminishes the reflex excitability of the spinal cord and paralyses the motor nerves; moreover, it is said to paralyse the cardiac inhibitory branches of the vagus. It kills mammals by impairing the activity of the respiratory centre; their life may be prolonged by artificial respiration. Careful experiments on a healthy man have shown that sparteine causes tingling and weakness of the extremities, without influencing either the composition or the quantity of the urine. Similar experiments with pure scoparin in large doses led to equally negative results as regards the urine. (J. W. Paton.)

Dose. Of decoction of broom, 2 fl. oz. to 4 fl. oz.; of the juice of broom, 1 fl. drm. to 2 fl. drm. or more.

PTEROCARPI LIGNUM. Red Sandal-wood. The sliced or rasped heart-wood of Pterocarpus santalinus; growing in Coromandel and Ceylon.

Description. Sandal wood occurs in billets, which are dense, externally of a dark brown colour, internally, if cut transversely, hard-grained, variegated with dark and light red rings. The powder is blood-red, of a faint peculiar odour, with an obscurely astringent taste. The wood occurs also in chips of deep reddish-brown colour.

Prop. & Comp. Sandal wood contains a principle called *Santalin*, crystalline and reddening in the air. The colour of the wood is extracted by alcohol and ether, and also by alkaline solutions.

Use. It is used to give colour to the compound tincture of lavender, and through this to the arsenical solution.

KINO. Kino. The juice (hardened in the sun) flowing from the incised bark of Pterocarpus marsupium, or Indian Kino Tree; growing near the Malabar Coast. Other varieties of Kino are met with, as African Kino, from Pterocarpus erinaceus; Botany Bay Kino, from Eucalyptus resinifera, &c.

Description. In small angular pieces, consisting of broken reddish-black tears, translucent, and ruby-red at the edges, shining, and brittle. The powder of kino is dark red, it has no odour, the taste is very astringent, and when chewed it tinges the saliva blood-red.

Prop. & Comp. Kino contains a species of *tannin*, called mimotannic acid (or catechu-tannic acid, $C_{18}H_{18}O_8$), and another astringent principle, found also in catechu, called *Catechin* ($C_{20}H_{18}O_8$), together with *red gummy matter*, &c. (See Catechu.)

Off. Prep. **Pulvis Kino Compositus.** *Compound Powder of Kino.* (Kino, in powder, three ounces and three quarters; opium, in powder, a quarter of an ounce; cinnamon, in powder, one ounce.)

One grain of opium is contained in twenty grains of the powder.

Tinctura Kino. *Tincture of Kino.* (Powdered kino, two ounces; glycerine, three fluid ounces; distilled water, five fluid ounces; rectified spirit, twelve fluid ounces. Prepared by macerating for seven days, filtering and adding sufficient rectified spirit to make one pint.) If made with proof spirit, it is apt to gelatinise after a little time from the gummy matters being deposited.

Kino is also contained in pulvis catechu compositus, one grain in five of the powder.

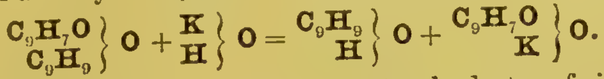
Therapeutics. A powerful astringent; may be given where tannin is indicated; it is less soluble than catechu; often employed in pyrosis and diarrhœa, and as a gargle in relaxed throat. Sometimes it is chewed, and the soluble portion is thus brought into contact with the relaxed parts. Custom has led to the use of certain astringents, as kino, catechu, hæmatoxylum, in the treatment of affections of the bowels; and this has doubtless arisen from their being of more value in such cases than the more soluble forms of tannin; the catechin probably in a great measure escapes absorption in the first portions of the alimentary canal, and hence acts more powerfully as an astringent upon the lower parts of the tube.

Dose. Of powdered kino, 10 gr. to 30 gr. or more; of the compound powder of kino, 5 gr. to 20 gr., the dose depending more on the opium than the kino. Of the tincture of kino, ½ fl. drm. to 2 fl. drm.

BALSAMUM PERUVIANUM. Peru Balsam. The balsam flowing from the trunk of Myroxylon Pereiræ after the bark has been beaten, scorched, and removed; obtained from Salvador in Central America.

Description. A thick, viscid, almost opaque substance, like treacle, but when in thin layers, dark red in colour, and translucent; of an agreeable fragrant odour, with an acrid but aromatic taste.

Prop. & Comp. Peru Balsam is of sp. gr. between 1·137 and 1·15; is soluble in five parts of rectified spirit, and undergoes no diminution in volume when mixed with water. It contains *cinnamein* (cinnamate of benzyl, $C_{16}H_{14}O_2$), which is a neutral oil; *metacinnamein*, a crystallisable solid, isomeric with the former; *cinnamic acid* ($C_9H_8O_2$), and *resins*, the two latter probably produced by the oxidation of metacinnamein. It also contains *styracin* (cinnamate of cinnyl, $C_{18}H_{16}O_2$), which latter, by the action of potash, becomes converted into cinnamate of potassium and styrone (cinnylic alcohol), thus :—



$$\left.\begin{matrix}C_9H_7O\\C_9H_9\end{matrix}\right\}O+\left.\begin{matrix}K\\H\end{matrix}\right\}O=\left.\begin{matrix}C_9H_9\\H\end{matrix}\right\}O+\left.\begin{matrix}C_9H_7O\\K\end{matrix}\right\}O.$$

Fremy regards the other resins present as hydrates of cinnamein. The amount of resin increases with age, and about six or seven per cent. of cinnamic acid is always present; this was formerly thought to be benzoic acid.

Therapeutics. A stimulant and expectorant, chiefly used in chronic bronchitis and rheumatism. It acts also on the mucous membranes, and may be used to restrain excessive discharges, as gleet, leucorrhœa, &c. The author has used Balsam of Peru in many cases of bladder affection accompanied with a secretion of fœtid mucus, with great benefit; also in the bronchitis of very old people. Externally, it also acts as a stimulant; useful to bed-sores and unhealthy ulcers; it may be conveniently rubbed up with yolk of egg, and applied to any part.

Dose. 10 min. to 15 min., and upwards, made into an emulsion with mucilage, or yolk of egg, or dropped on lumps of white sugar.

BALSAMUM TOLUTANUM. Tolu Balsam. The balsam (indurated) flowing from the incised trunk of Myroxylon toluifera, or Balsam of Tolu Tree; growing in Central America, Carthagena, mountains of Tolu, &c.

Description. A reddish-yellow substance, not unlike resin; soft when first imported, becoming hard by age; more or less transparent. Odour and taste the same as balsam of Peru, but less powerful.

Prop. & Comp. Softens by heat, becomes brittle in the cold; is soluble in alcohol, ether, and in rectified spirit; yields cinnamic acid to water; it is similar in composition to balsam of Peru, containing *styracin* or *meta-cinnamein*, *cinnamic acid*, and *resin*.

Off. Prep. **Syrupus Tolutanus.** *Syrup of Tolu.* (Balsam of Tolu, one ounce and a quarter; distilled water, one pint, or a sufficiency; sugar, two pounds. Boil the balsam in the water for half an hour in a covered vessel, frequently stirring, remove from the fire and add distilled water, so that the liquid shall measure sixteen ounces; and strain the liquor when cold; then add the sugar and dissolve it.) The product should weigh three pounds, and should have specific gravity 1·33.

Tinctura Tolutana. *Tincture of Tolu.* (Balsam of Tolu, two ounces and a half; rectified spirit, one pint. Prepared by maceration.)

Balsam of Tolu is also contained in tinct. benzoini comp.

Therapeutics. Exactly the same as the balsam of Peru.

Dose. Of the balsam, 10 gr. to 20 gr. ; of the syrup, 1 fl. drm. to 3 fl. drm. ; of the tincture, 20 min. to 40 min.

PHYSOSTIGMATIS SEMEN. Calabar Bean. The seed or bean of Physostigma venenosum. Western Africa.

PHYSOSTIGMINA. Physostigmine. Eserine. $C_{15}H_{21}N_3O_2$. An alkaloid obtained from Calabar Bean.

Description. The beans have a shining integument of a brown coffee colour ; they are about an inch in length, and half an inch in thickness, reniform in shape, with a shorter or concave and a longer or convex margin, and on the convex edge is a furrow with elevated ridges, pierced by a foramen at one extremity. The kernel consists of two large concavo-convex cotyledons of a white colour, weighing on an average forty-six grains, easily pulverisable, tasting like edible leguminous seeds, neither bitter, aromatic, nor acrid. It yields its virtue to alcohol ; imperfectly to water. The cotyledons moistened with potash acquire a permanent pale yellow colour.

Prop. & Comp. The active principle, *physostigmine* or *eserine*, ($C_{15}H_{21}N_3O_2$) is contained to the greatest extent in the kernel ; it is obtained from the alcoholic extract, by dissolving it in water, adding bicarbonate of sodium, shaking the mixture with ether, which dissolves the alkaloid, and then evaporating the ethereal liquid. Thus prepared it forms colourless or pinkish crystals, sparingly soluble in water ; readily so in alcohol and in dilute acids. The aqueous solution is alkaline and bitter in taste ; when warmed with, or shaken with potash it becomes red ; and when evaporated to dryness over a water-bath it leaves a bluish residue, the acidified solution of which is beautifully dichroic, being blue and red. The solution in acids is generally red.

Off. Prep. **Extractum Physostigmatis.** *Extract of Calabar Bean.* (Calabar bean, in powder, a pound ; rectified spirit, four pints.)

Lamellæ Physostigminæ. *Discs of Physostigmine.* (Discs of gelatine, with some glycerine, each weighing about one-fiftieth of a grain, and containing one-thousandth of a grain of physostigmine.)

Therapeutics. Given to warm-blooded animals in a poisonous dose, calabar bean may cause death either by asphyxia, or by cardiac paralysis, independently of its action on the respiratory movements. The alternative is decided by the rapidity with which poisoning is induced. In medium doses, or when the poison is gradually absorbed, the animal succumbs to asphyxia; when the dose is large, or when the poison is directly introduced into the circulation, to cardiac paralysis. The asphyxia is not due to palsy of the motor nerves, but to a partial or complete paralysis of the respiratory centre in the medulla. A small but still fatal dose, given to a frog, gradually produces paralysis of the motor nerves and exalted tactile sensibility of the afferent nerves.

Physostigmine acts on the heart as a depressant, reducing the frequency of its pulsations. Section of the vagi does not prevent this, showing that the poison does not slow the heart by stimulating its inhibitory nerves. It exerts no specific action on the muscular tissue of the organ. Hence it probably acts by paralysing the accelerator nerves and ganglia. When a large dose has caused death by syncope, the heart is found at rest in diastole, with its cavities full of blood. Physostigmine paralyses the cervical sympathetic nerves of the rabbit before the death of the animal. When the capillary circulation of the frog's web is examined, it is found that soon after the exhibition of the poison, the small arteries and veins undergo slight contraction, followed by a rapid and permanent dilatation. This seems to occur all over the body, and is evident, though less marked, in birds and mammals. Physostigmine has no specific action on the blood, which is found dark after death.

Applied to the eye, calabar bean and physostigmine make the pupil contract. Contraction of the pupil occurs whenever birds and mammals are rapidly poisoned by the internal administration of the drug; but this contraction may be slight and of short duration and easily overlooked owing to the subsequent dilatation.

Physostigmine has no specific action on the voluntary muscles of the frog; in warm-blooded animals it causes fibrillar twitchings, which continue even after the muscle is completely detached from the nervous system. It acts as an excitant of the secretory organs, increasing the action of the alimentary, mucous, lachrymal and salivary glands. It does not appear to exert any direct influence on the cerebral functions. (The above is a brief summary of results arrived at by Dr. T. R. Fraser.)

Dr. Christison had previously made known some of the physiological effects of calabar bean from an experiment on his own person when taking about twelve grains of the seed: the chief symptoms experienced were vertigo, intense prostration, pallor, a very weakened condition of pulse, and irregular action of the heart; also a loss of power over the muscles; the contraction of the pupil was not looked for. Dr. Fraser has since demonstrated the existence of a very perfect physiological antagonism between atropine and physostigmine. (*See* Atropine.)

The physiological action of the drug has led to its use in the treatment of strychnine-poisoning, tetanus, chorea, general paralysis of the insane, and certain conditions of the eye.

I. Calabar bean may be applied to the eye in the form of a watery solution of the extract, or as the discs of physostigmine. These discs are so made that a single one suffices to cause complete contraction of the pupil of the eye to which it is applied. Similar discs are prepared with atropine, and of such a strength that the dilatation produced by one of them is exactly neutralised by a corresponding disc of calabar bean. The drug causes:—1. Dilatation of conjunctival vessels; the redness and irritation soon pass off. 2. Spasm of ciliary muscle—myopia. 3. Spasm of sphincter pupillæ—myosis. Accordingly it is employed to counteract the topical effects of atropine, and to remedy paralysis of accommodation and of the circular fibres of the iris.

II. Its depressant influence on the reflex activity of the spinal cord has led to its administration in strychnine-poisoning and in tetanus. There can be no doubt that it is capable of rendering the rigid muscles of a tetanic patient perfectly flaccid. Moreover, cases are on record of recovery both from poisoning by strychnine and from tetanus, under the influence of the drug. But to produce any effect it has to be given in doses so large as to cause very considerable—perhaps dangerous—depression of the heart. The writer has seen the pulse fall from 120 to 80 in the course of a few minutes after the subcutaneous injection of one-third of a grain of the extract. Moreover, it causes nausea and vomiting, purging, and abundant perspiration.

III. Calabar bean has been given in chorea. But for this disease we possess other remedies, probably as effectual, and certainly less dangerous. Besides, it is doubtful whether chorea be due to exalted reflex activity of the spinal cord at all.

IV. Dr. C. Browne has found it of use in general paralysis of the insane, probably by its influence upon the circulation.

V. The physiological antagonism between atropine and physostigmine points to the use of the latter drug as an antidote in poisoning by the former. Clinical evidence on this head is still very inadequate.

Dose. 1 gr. to 4 gr. of the powder; $\frac{1}{16}$ to $\frac{1}{4}$ gr. of the extract.

In tetanus, enough must be given to produce the physiological symptoms of the drug. $\frac{1}{3}$ gr. of the extract, rubbed up with 10-15 minims of water and neutralised with a little carbonate of sodium, may be injected every two or three hours subcutaneously, where swallowing causes pharyngeal spasm. If given by the stomach, 1 gr. of the extract, rubbed up with a little weak spirit.

CHRYSAROBINUM. Chrysarobin. The medullary matter of the stem and branches of Andira Araroba; dried and powdered; containing more or less chrysophanic acid according to age and condition, and yielding much chrysophanic acid by oxidation.

Synonyms. Araroba Powder; Goa Powder.

Description. Chrysarobin, as purified by solvents, is a light brownish-yellow, minutely crystalline powder, tasteless and inodorous. Almost insoluble in water, entirely soluble in hot rectified spirit, in ether, and in boiling benzol. It melts on being heated, partly sublimes in yellow vapours and leaves a charred residue which is wholly dissipated on ignition. It dissolves in sulphuric acid, forming a yellowish-red solution; it also dissolves in caustic potash, and gives a yellow or reddish solution changed to carmine by absorption of oxygen.

Off. Prep. **Unguentum Chrysarobini.** *Ointment of Chrysarobin.* (Chrysarobin, twenty grains; benzoated lard, four hundred and eighty grains.)

Therapeutics. Chrysarobin is mainly employed externally as the ointment in psoriasis and parasitic affections. It may cause much irritation, hence it should not be employed over too large a surface, nor to the head, where it may cause œdema. It discolours the skin, producing purple or violet stains, which, however, are not permanent. It also marks the clothing. It has occasionally been used with good effect internally, when a large part of the skin is affected, or when it is undesirable to cause staining of exposed portions of the skin. It may thus be given in eczema, acne, psoriasis, and other skin diseases.

Dose. $\frac{1}{6}$ gr. to $\frac{1}{2}$ gr.

CÆSALPINIEÆ.

HÆMATOXYLI LIGNUM. Logwood. The sliced heart-wood of Hæmatoxylon campechianum: a native of Campeachy; growing in the West Indian Islands and in India.

Description. It occurs in billets, consisting of the heart-wood only, which is heavier than water, of a dark red colour, and with a very astringent taste. It is cut into chips, which have a feeble agreeable odour; a small portion chewed imparts to the saliva a dark pink colour.

Prop. & Comp. Water and alcohol dissolve the colouring and astringent principles: the solutions are deepened in colour by alkalies, and rendered rather turbid by acids. It contains *hæmatoxylin* ($C_{16}H_{14}O_6$), which, when quite pure, forms white crystals, either with one or three atoms of water of crystallisation; soluble in alcohol and ether, but sparingly so in water; when acted on by alkalies or oxidising agents it becomes red. There are also present *tannin*, *resin*, and the ordinary constituents of wood. Hæmatoxylin is occasionally found crystallised in the crevices of the wood.

Off. Prep. **Decoctum Hæmatoxyli.** *Decoction of Logwood.* (Logwood, in chips, one ounce; cinnamon, in powder, fifty-five grains; distilled water, one pint.)

Extractum Hæmatoxyli. *Extract of Logwood.* (Logwood chips, one pound; boiling distilled water, one gallon. Prepared by maceration and evaporation to a proper consistence.)

Therapeutics. Logwood is chiefly employed as an astringent in affections of the alimentary canal, as diarrhœa, chronic dysentery, and some forms of atonic dyspepsia; it is often given to children. The urine of patients taking logwood exhibits a pink colour when that fluid becomes alkaline from any cause, a fact which has led, in children, to the suspicion of blood in the urine; in strongly acid urine the colour may not be seen, but the addition of ammonia readily brings it out.

Dose. Of decoction of logwood, 1 fl. oz. to 2 fl. oz.; of extract of logwood, 10 gr. to 30 gr.

SENNA ALEXANDRINA. Alexandrian Senna. The dried leaflets of Cassia acutifolia (Cassia lanceolata) imported from Alexandria.

SENNA INDICA. East Indian Senna. (Syn. Tinnevelly senna.) The dried leaflets of Cassia angustifolia (Cassia elongata); growing chiefly in Southern India.

Description. The leaflets of both varieties of senna are of a greenish colour, with a faint peculiar odour, and with mucilaginous, nauseous, and sickly taste; they are both *unequally* oblique at the base. The leaves of *Cassia acutifolia* are lanceolate, acute, about an inch in length, evidently veined on the lower surface, and very finely pubescent or nearly smooth; those of *elongata* (Tinnevelly) about one to two inches long, lanceolate and acute.

Alexandrian senna usually consists of leaflets of *cassia acutifolia* (lanceolata), and of *cassia obovata*, with pods and broken leaf-stalks; together with the leaves of *solenostemma argel*, and sometimes, but not in English commerce, with those of *colutea arborescens*, and *coriaria myrtifolia*. Alexandrian senna has been stated to have about the following proportions of ingredients; five parts of the leaflets of *cassia acutifolia* (lanceolata), three parts of *cassia obovata*, and two parts of *cynanchum argel*. According to the Pharmacopœia true senna leaves should be carefully separated from all extraneous matter.

Solenostemma argel leaves are distinguished by being about one inch long, equal at the base, no lateral nerves on the under-surface: pale in colour, thick and coriaceous in consistence. This addition to senna is important, as the argel is supposed to gripe and nauseate.

The leaflets of *colutea arborescens*, or bladder senna, are ovate, and equal at the base; those of *coriaria myrtifolia* have a strongly marked lateral nerve on each side of the mid-rib.

The leaflets of *tephrosia apollinea*, distinguished by having parallel transverse veins, and being silky on the under-surface, have sometimes been met with in Alexandrian senna.

Prop. & Comp. Senna has a faint odour and nauseous taste; it imparts its virtues to water, either hot or cold; also to alcohol; it contains *Cathartin*, which can only be separated as a yellowish-red deliquescent substance, not crystallisable, with a trace of volatile oil, and the ordinary constituents of leaves. The cathartin is stated by some not to be the active principle.

Off. Prep.—Of Alexandrian or of East Indian Senna:—

Confectio Sennæ. *Confection of Senna.* (Senna, in fine powder, seven ounces; coriander, in fine powder, three ounces; figs, twelve ounces; tamarind, nine ounces; cassia pulp, nine ounces; prunes, six ounces; extract of liquorice, one ounce; refined sugar, thirty ounces; distilled water, a sufficiency to make seventy-five ounces.)

Infusum Sennæ. *Infusion of Senna.* (Senna, an ounce; ginger sliced, twenty-eight grains; boiling distilled water, ten fluid ounces. Infuse for half an hour in a closed vessel, and strain.)

Mistura Sennæ Composita. *Compound Mixture of Senna.* (Sulphate of magnesium, four ounces; liquid extract of liquorice, one ounce; tincture of senna, two and a half fluid ounces; compound tincture of cardamoms, one fluid ounce and a half; infusion of senna, fifteen fluid ounces.)

Pulvis Glycyrrhizæ Compositus. (*See* Glycyrrhiza.)

Syrupus Sennæ. *Syrup of Senna.* (Senna, broken small, sixteen ounces; oil of coriander, three minims; refined sugar, twenty-four ounces; distilled water, five pints, or a sufficiency; rectified spirit, three fluid ounces. Digest the senna in seventy ounces of the water at 120° F. (48°·9 C.) for twenty-four hours; press and strain. Digest the marc in thirty ounces of the water for six hours at the same temperature; press and strain. Evaporate the mixed liquors to ten fluid ounces; and when cold add the rectified spirit, previously mixed with the oil of coriander. Clarify by filtration, and wash what remains on the filter with distilled water, until the washings make up the filtrate to sixteen fluid ounces; then add the sugar, and dissolve by means of a gentle heat.) The product should weigh two pounds ten ounces, and should have sp. gr. 1·31.

Tinctura Sennæ. *Tincture of Senna.* (Senna, broken small, two ounces and a half; raisins free from seeds, two ounces: caraway and coriander, each half an ounce; proof spirit, one pint.)

Therapeutics. Senna is a rather brisk purgative, increasing considerably the peristaltic action, and also to some extent the liquid flow from the intestines; it appears to act chiefly on the small intestines, and less on the colon and rectum than aloes; sometimes nausea and griping are produced if the drug is given alone; it is generally combined with salines, as Epsom salts or tartrate of potassium, and some aromatic; such combination forms the "black draught," and the compound senna mixture of the Pharmacopœia. Senna is given when constipation is present in dyspepsia, and in almost all febrile and inflammatory diseases; as it is somewhat drastic, it should not be given when the alimentary canal is in an irritable condition.

Dose. Of the infusion, 1 fl. oz. to 2 fl. oz.; of compound senna mixture, 1 fl. oz. to 1½ fl. oz.; of the tincture, 1 fl. drm. to ½ fl. oz.; of the confection, 60 gr. to 120 gr.; of the syrup, 1 fl. drm. to 4 fl. drm. (generally given to infants). The present syrup is an effectual preparation.

For the *Adulterations* of Senna, see *Description.*

CASSIÆ PULPA. Cassia Pulp. The pulp of the pods of Cassia fistula; Pudding Pipe Tree, or Purging Cassia; from the East Indies, or recently extracted from pods imported from the East or West Indies.

Description. The fruit is a cylindrical pod or legume, from 1 to 2 feet long, about the size of the thumb, having 2 bands extending the whole length, divided internally into numerous cells by transverse partitions, each containing a seed, surrounded by a blackish soft pulp, which is the part made use of in medicine. The heavier the pod the more pulp it contains.

Prop. & Comp. The pulp has a sweetish, rather disagreeable, taste; it is of a blackish-brown colour, usually mixed with the seeds and dissepiments, which should be removed for pharmaceutical purposes; it contains sugar, pectin, mucilage, and some principle probably similar to that found in senna.

Off. Prep. Cassia is contained in Confectio Sennæ.

Therapeutics. A slight laxative, apt to disturb the bowels by producing flatulence; seldom given alone.

Dose. Of the prepared pulp, 120 gr. upwards.

TAMARINDUS. Tamarind. The preserved pulp of the fruit of Tamarindus indica or Tamarind Tree; growing in the East and West Indies. The East Indian pod is larger than that from the West Indies: at present it chiefly comes from the West Indies.

Description. The pods are about 4 or 5 inches long, and $\frac{3}{4}$ inch broad, flattened and curved; internally divided into cells containing oval seeds, surrounded by the pulp, which is soft, of a brownish-red colour, and sweet acidulous taste, and contains strong fibres; the seeds are brown and shining, and enclosed in membranous coats.

Prop. & Comp. It contains sugar, pectin, free *citric* and *tartaric* acids, *bitartrate of potassium*, &c. A piece of bright iron left in contact with the pulp for an hour, should not exhibit any deposit of copper.

Off. Prep. Tamarinds are contained in Confectio Sennæ.

Therapeutics. Tamarinds act as a very slight laxative, besides which they are refrigerant from the acids they contain, and useful when infused as a cooling drink in febrile affections.

Dose. $\frac{1}{4}$ oz. upwards. A whey may be made by boiling the pulp with milk.

COPAIBA. Copaiva or Copaiba. An oleo-resin flowing from the incised trunk of Copaifera Langsdorffii and other species of Copaifera; growing in the West Indies and tropical parts of America, and obtained chiefly from the valley of the Amazon.

OLEUM COPAIBÆ. Oil of Copaiva. Oil distilled from the oleo-resin.

Description. The oleo-resin is a transparent liquid, about the consistence of thick oil, of a yellow colour, characteristic odour, and slightly acrid, nauseous, terebinthinate taste. The Brazilian variety, which is chiefly met with, is much paler than the West Indian. The volatile oil is a colourless or pale yellow liquid, with the odour and taste of copaiva.

Prop. & Comp. Copaiva consists of about 52 per cent. of *resin*, and 40 per cent. of the *volatile oil*, but the proportions vary with age and exposure; its sp. gr. is about 0·95; the resin, copaivic acid ($C_{20}H_{30}O_2$), closely resembles common resin or pinic acid, and is crystalline. The volatile oil ($C_{10}H_{16}$), except in odour and taste, is closely allied to oil of turpentine. Besides these principles, about 1½ or 2 per cent. of a soft brown resinous matter is contained in copaiva, the nature of which is unknown; it seems to increase in amount as the copaiva becomes old.

The oleo-resin is perfectly soluble in an equal volume of benzol; does not become gelatinous after having been heated to 270° F. (132°·3 C.), showing the absence of East Indian wool oil, which otherwise closely resembles copaiva. It is not fluorescent. It dissolves one-fourth of its weight of carbonate of magnesium by the aid of heat, and remains transparent.

Therapeutics. Copaiva acts as a stimulant like other terebinthinate drugs; its influence is more particularly directed to the mucous membranes, especially that of the genito-urinary organs; when taken into the stomach it becomes absorbed, and can be detected both in the breath and urine by the peculiarity of its odour; from the latter fluid it may be separated by ether. It has been shown that only the resinous acid appears in the urine; the volatile oil being either exhaled from the lungs or oxidised in the body.

The action of copaiva upon the urethra appears to be, at least in part, local, but the topical application of the drug in the form of injection fails to produce the same effect as its internal administration, probably from its not being presented to the parts in the same condition. If cold nitric acid is added to the urine of patients taking copaiva, a milkiness is produced, as from albumen, but this disappears when heat is applied; the turbidity is due to the separation of the copaivic acid, which melts and becomes transparent when the urine is heated. In large doses it occasionally gives rise to a papular eruption on the skin, often attended with much irritation.

Copaiva is used with great success in affections of the urethra and bladder, as gonorrhœa, gleet, and chronic cystitis. It may also be given advantageously in chronic bronchitis, accompanied by excessive secretion of mucus, and in diseased conditions of the mucous membrane of the rectum ; it should be avoided in febrile states of the system. The action of the *volatile oil* resembles that of the balsam itself. Copaiva is a very powerful diuretic. It should not be given in cases of renal dropsy, or when there is evidence of renal congestion. It is most efficacious in simple ascites from cirrhosis of the liver, without attendant albuminuria. Dr. Wilks has found that the pure resin is as efficacious as the oleo-resin in causing diuresis, while it is free from the nauseous odour of the oil.

Dose. Of copaiva, ½ fl. drm. to 1 fl. drm. ; of oil of copaiva, 5 min. to 20 min. Of the resin (as a diuretic) 15 gr. to 20 gr. in almond emulsion.

Copaiva may be taken rubbed up with the yolk of egg, or floating upon water or some other liquid, or made into pills with burnt magnesia, or lastly, dissolved in water by the aid of liquor potassæ, with which it forms a soap. Frequently to hide its disagreeable taste it is put into membranous or gelatinous capsules.

Adulteration. Turpentine and fixed oils may be mixed with copaiva : if a little of the suspected drug is heated on paper, turpentine can be detected by the odour, and all fixed oils by a greasy ring surrounding the resinous stain which is left by pure copaiva. Its power of dissolving carbonate of magnesium may also be used as a test.

MIMOSEÆ.

ACACIÆ GUMMI. Gum Acacia. A gummy exudation from the stem and branches of Acacia Senegal, and from other species of Acacia ; collected chiefly in Kordofan in Eastern Africa, and imported from Alexandria.

Description. Gum is usually a natural exudation from the tree ; sometimes however incisions are made to favour its flow ; it occurs in small rounded or spheroidal tears of different sizes, usually from half an inch to an inch in length, or in fragments with shining facets ; and opaque from innumerable fissures on the surface ; brittle, devoid of odour, and with a bland mucilaginous taste.

Prop. & Comp. Gum is entirely soluble in water, forming a mucilage, but it is insoluble in alcohol. It consists of *gummic acid* ($C_{12}H_{22}O_{11}$), in combination with calcium, magnesium, and potassium, 70 per cent.; water, 17 per cent.; and a small quantity of acid malate of calcium, chlorides of calcium and potassium, with traces of iron, silica, and phosphate of calcium; the solution forms with subacetate of lead an opaque white jelly of gummate of lead. Gummic acid is converted by the action of nitric acid into mucic acid, but is not convertible into sugar. The addition of iodine to the powder, or to a solution formed with boiling water, produces no violet or blue colour, showing absence of starch.

Off. Prep. **Mucilago Acaciæ.** *Mucilage of Gum Acacia.* (Gum acacia, in small pieces, four ounces; distilled water, six fluid ounces; strain through muslin, if necessary.)

Gum is also contained in mistura cretæ, mistura guaiaci, pulvis amygdalæ compositus, pulvis tragacanthæ compositus, and in all the Trochisci or Lozenges.

Therapeutics. Gum acts simply as a demulcent, and is employed to allay irritation of the mucous membranes, as of the fauces, pharynx, and stomach; it is likewise frequently used for the purpose of suspending heavy powders, as subnitrate of bismuth, oxide of zinc, &c., when administered in the liquid form, but for this purpose tragacanth is preferable. Gum has been proposed as a substitute for amylaceous food in the treatment of diabetes mellitus, as it is not converted into sugar, but its use does not appear to have been attended with any benefit; whether or not it passes through the kidneys unchanged has not been clinically determined. The author has failed to detect gum in the urine, after having administered as much as half a pound a day to a patient. It is however often used in irritation of the bladder and urethra, from an idea of its acting as a demulcent upon the mucous membrane of the urinary passages; but it is probable that the increased quantity of fluid which is taken along with the gum diminishes the acidity of the urine in such cases.

Dose. Gum may be given *ad libitum;* the author has given ½ lb. per diem in diabetes, without any perceptible symptom being produced.

CATECHU NIGRUM. Black Catechu. (Not official.) An extract from the wood of Acacia Catechu; imported from Pegu.

Description. It occurs in irregular masses, consisting of layers enveloped in rough leaves, hard, yet brittle; of a blackish-red colour and shining surface, with a very astringent and bitter taste, followed by an impression of sweetness. (See Catechu.)

INDIGO. C_8H_5NO. Prepared from several species of Indigofera; it is introduced into the Appendix of the Pharmacopœia to make the following preparation.

SOLUTION OF SULPHATE OF INDIGO. (See Appendix.)

Prep. By dissolving five grains of indigo in one fluid drachm of sulphuric acid with the aid of heat, and then diluting with sulphuric acid till the whole measures ten fluid ounces.

Prop. & Comp. Indigo Blue, or indigotin (C_8H_5NO), is insoluble in water, but by the action of deoxidising agents it is changed into white indigo, which contains one more atom of hydrogen than indigotin; this is soluble in water, and by exposure to the air becomes reconverted into the blue variety. The solution of sulphate of indigo contains a peculiar compound of the acid and the colouring matter, called sulphindigotic acid (C_8H_5NO,SO_3). This solution is used as a test for free chlorine in hydrochloric acid and liquor sodæ chlorinatæ; if free chlorine is present, the colour is destroyed.

Therapeutics. The action of indigo as a therapeutic agent requires further investigation; it has been employed in epilepsy; it colours the urine green or bluish-green.

ROSACEÆ.

ROSÆ CENTIFOLIÆ PETALA. Cabbage Rose Petals. The fresh fully expanded petals of Rosa centifolia, the Cabbage, Damask, or Hundred-leaved Rose; cultivated in Europe; a native of Persia and the Caucasus. The petals should be obtained from plants cultivated in Britain.

Description. The petals, familiar to all, are ordered to be used when fresh, as they lose their odour by drying. They have a sweetish-bitter and faintly astringent taste, odour roseate; both readily imparted to water.

Prop. & Comp. Odour fragrant, depending upon a *volatile oil;* besides this, some colouring matter and a slight laxative principle exist in the petals, as well as a trace of *tannic* or *gallic acid.* The volatile oil, known under the name of Attar of Roses, is prepared in India; a very small quantity exists in the rose petals.

Off. Prep. **Aqua Rosæ.** *Rose Water.* (Fresh petals of the hundred-leaved rose, ten pounds; water, five gallons. Let a gallon distil.)

Therapeutics. Rose water is used only as an agreeable vehicle for the administration of medicines; much employed in making lotions. It is contained in mistura ferri composita and trochisci bismuthi.

Dose. Of rose water, *ad libitum.*

ROSÆ GALLICÆ PETALA. Red Rose Petals. The fresh and dried unexpanded petals of Rosa gallica, the Red or French Rose; grows in Austria and South of Europe. Should be obtained from plants cultivated in England.

Description. The flower-buds deprived of the calyx and claws are employed in medicine; they are about the size of a nutmeg, of a purplish-red colour, with an astringent taste, and a roseate odour, developed by drying.

Prop. & Comp. The petals contain *red colouring matter*, *tannic* or *gallic acid*, and a trace of *volatile oil;* the colour is acted on by light. An infusion of the petals becomes bright red with acids and green with alkalies.

Off. Prep. **Confectio Rosæ Gallicæ.** *Confection of Roses.* (Fresh red rose petals, one pound; sugar, three pounds. Pound the rose petals in a stone mortar; add the sugar, and pound them again until incorporated.)

Infusum Rosæ Acidum. *Acid Infusion of Roses.* (Dried red rose petals, a quarter of an ounce; dilute sulphuric acid, one fluid drachm; boiling distilled water, ten fluid ounces.) It is of a bright red colour, from the action of the sulphuric acid on the colouring matter of the rose petals.

Syrupus Rosæ Gallicæ. *Syrup of Red Roses.* (Dried red rose petals, two ounces; refined sugar, thirty ounces; boiling distilled water, one pint. The product should weigh two pounds fourteen ounces, and should have sp. gr. 1·335.)

Therapeutics. Red rose petals are astringent, from tannin or gallic acid; they are, however, oftener used on account of their colouring matter. The confection is employed as a pill basis, occasionally as a slight astringent, and is applied in aphthous conditions of the mouth in the form of a linctus. The acid infusion makes an excellent gargle, and is given internally as an astringent or as a vehicle for more powerful medicines, as Epsom salts, sulphate of quinine, &c. A preparation made with honey, mel rosæ, not now official, is a favourite astringent application to aphthæ in children.

Dose. Of the confection, 60 gr. or more; of the acid infusion, 1 fl. oz. to 2 fl. oz.; of the syrup, 1 fl. drm. or more, if given internally.

ROSÆ CANINÆ FRUCTUS. Fruit of the Dog-Rose. Hips. The fresh fruit of Rosa canina, the Dog Rose, and other allied species; indigenous.

Description. The ripe fruit of indigenous plants, three-quarters of an inch or more in length, ovate, scarlet, smooth, shining; taste sweet, subacid, pleasant.

Prop. & Comp. The pulp contains *citric* and *malic acids*, with citrates, malates, sugar, a little tannin, and a trace of volatile oil.

Off. Prep. **Confectio Rosæ Caninæ.** *Confection of Hips.* (Hips, deprived of their seeds, one pound; refined sugar, two pounds. Rub the pulp, gradually adding the sugar, until thoroughly incorporated.)

Therapeutics. A slight refrigerant, also somewhat astringent. In the form of the confection it is used to form a linctus.

Dose. Of confection, 60 gr., or more.

AMYGDALA AMARA. Bitter Almond. The ripe seed of the Bitter Almond Tree, Prunus Amygdalus, var. Amara (Amygdalus communis, var. Amara D. C.). Brought chiefly from Mogadore.

AMYGDALA DULCIS. Sweet Almond. Jordan Almonds. The ripe seed of Prunus Amygdalus, var. Dulcis (Amygdalus communis, var. Dulcis D. C.); the Sweet Almond Tree; growing in Syria, Persia, also in Northern Africa and Southern Europe. The seed, from trees cultivated about Malaga, and known as the Jordan Almond.

OLEUM AMYGDALÆ. Almond Oil. The oil expressed from the Bitter or Sweet Almond.

Description. The character of the *almond seed* is well known; it is above an inch in length, lanceolate, acute, with a clear cinnamon-brown seed-coat, and a bland, sweetish, nutty-flavoured kernel: the bitter almond is the shorter and broader of the two. The *oil* is of a very pale yellow colour, obtained by expression, and whether from the sweet or bitter variety it is the same in properties and composition, being nearly inodorous, or having a nutty odour with a bland oleaginous taste.

Prop. & Comp. Both varieties of almonds contain about 50 per cent. of the *fixed oil*, chiefly olein—an albuminous principle, soluble in water, called *emulsin*,—with sugar, gum, and woody fibre; the bitter variety, in addition to these, possesses a peculiar white crystalline glucoside, *Amygdalin* ($C_{20}H_{27}NO_{11}+3H_2O$), soluble in water and alcohol, the solutions having a slightly bitter taste. It is to the presence of this body that the peculiar properties of the bitter almond are due, for when amygdalin is acted on by the emulsin, as occurs on moistening the almond, a species of fermentation ensues, and *hydrocyanic acid* (**HCN**) and *volatile oil of bitter almonds* or hydride of benzoyl (C_7H_5O,H) are formed, with a little glucose and formic acid, hence poisonous effects may result from such decomposition, which may be represented thus,

$$C_{20}H_{27}NO_{11}+2H_2O=HCN+C_7H_6O+2C_6H_{12}O_6.$$

The *volatile oil*, when deprived of prussic acid, is not poisonous, and resembles in appearance other volatile oils; it is chiefly composed of hydride of benzoyl (C_7H_5O,H); on exposure it absorbs oxygen, and is converted into benzoic acid ($C_7H_6O_2$); it is procured by distilling the marc, left after the expression of the fixed oil from bitter almonds, with water; that sold in the shops is intensely poisonous from the large amount (from 4 to 8 per cent.) of prussic acid contained in it.

Off. Prep.—Of Almonds. **Mistura Amygdalæ.** *Almond Mixture.* (Compound powder of almonds, two ounces; distilled water, sixteen fluid ounces.)

Pulvis Amygdalæ Compositus. *Compound Powder of Almonds.* (Sweet almonds, eight ounces; refined sugar in powder, four ounces; gum acacia in powder, one ounce.)

Of Almond Oil.

Used in oleum phosphoratum, unguentum cetacei, unguentum resinæ, unguentum simplex, &c.

Therapeutics. Sweet almonds are nutritive, from the albuminous, oleaginous, and saccharine matters contained in them they are likewise demulcent, and are either used on account of this property, or more commonly the official preparations are employed as vehicles for the exhibition of other remedies: the fixed oil may be also used as a demulcent; in large doses it is purgative. Bitter almonds are poisonous in large quantities, and their exhibition is not advisable, the amount of prussic acid generated being very variable, and the official acid can always be prescribed with equal advantage and much greater safety. (See Acidum Hydrocyanicum Dilutum.)

An almond cake made from the non-amylaceous powder of the sweet almond has been proposed by Dr. Pavy as a substitute for bread in the treatment of diabetes.

Dose. Of compound powder of almonds, 60 gr. to 120 gr.; of almond mixture, 1 fl. oz. to 2 fl. oz.; of almond oil (fixed), 1 fl. drm. to ½ fl. oz.

PRUNUM. The Prune. The dried drupe of the Prunus domestica, or Common Plum Tree; growing in Syria and in different parts of Europe. Imported from the South of France.

Description. The finest and sweetest varieties are used as a condiment; the smaller kind, more acid and less pleasant, are employed in medicine. They are about an inch long, ovate, wrinkled, black, sweet, and somewhat acid.

Prop. & Comp. Prunes contain a little malic acid, sugar, and a purgative principle the nature of which is unknown.

Off. Prep. Prunes are contained in confect. sennæ.

Therapeutics. Seldom prescribed by the physician, but often used as a domestic laxative medicine; they are somewhat apt to cause flatulence and griping.

Dose. 2 oz. and upwards. Prunes are often added to an infusion of senna to increase its purgative action and render it more palatable.

LAUROCERASI FOLIA. Cherry-Laurel Leaves. The fresh leaves of Prunus Laurocerasus, the Cherry Laurel; a native of Asia Minor, but cultivated in English gardens.

Description. The leaves of the cherry laurel are four or five inches long, and about two broad; coriaceous in texture, ovate-lanceolate or elliptical, with a few dentations; shining and smooth on the upper surface, dull on the under surface and of a lighter colour, with two or four glands, and strong short foot-stalks; emitting a ratafia odour when bruised.

Prop. & Comp. On distillation with water they yield volatile oil and some prussic acid: neither of these substances is present in the leaves; *Amygdalin* however exists in them, and it is by the decomposition of this principle that the above products are obtained. (See Amygdala.)

Off. Prep. **Aqua Laurocerasi.** *Laurel Water.* (Fresh leaves of common laurel, one pound; water, two pints and a half. Distil one pint, shake the product, and filter through paper; preserve in a stoppered bottle.)

Therapeutics. Action like that of prussic acid. The strength of the above preparation is very variable, and this fact constitutes the great objection to its use, especially as all the valuable effects may be obtained by the use of the official acid. It is considered by some physicians to be an elegant mode of administering hydrocyanic acid.

Dose. ½ fl. drm. to 2 fl. drm.

CUSSO. Kousso. The dried panicles (chiefly of the female flowers) of Hagenia Abyssinica (Brayera anthelmintica). The tree is a native of Abyssinia, growing chiefly on elevated ground, several thousand feet above the level of the sea.

Description. In compressed clusters, or more or less cylindrical rolls, ten inches or more in length, with small reddish-brown flowers, on short hairy stalks, the outer limb of calyx five parted, the segments oblong or oblong-lanceolate reticulated. The general colour of kousso, viewed *en masse*, is brownish or reddish, with the red edges of the petals of the flower appearing pretty frequently and streaking the ground colour. It has a herby odour, somewhat like that of tea. It is safer to buy it with the flowers whole than in a state of powder, as in the latter case it is more readily adulterated.

Prop. & Comp. Kousso may be obtained either in the form of powder or of the dried flowers. It contains a volatile oil, gum, sugar, &c., and a crystallisable principle, *koussin*, but whether its active properties are due to the latter substance is unknown.

Off. Prep. **Infusum Cusso.** *Infusion of Kousso.* (Kousso, in coarse powder, half an ounce. Boiling distilled water, eight fluid ounces. Prepared without straining.)

Therapeutics. Kousso acts as an efficient anthelmintic. Whether it is superior to other remedies of the same class, is as yet doubtful; it has little or no cathartic power, and the subsequent administration of a purgative is generally required to bring away the entozoa, which the kousso seems to destroy. It has been chiefly employed in cases where tape-worm is suspected, or known to be present. Nausea, and even vomiting, are frequently induced by the drug.

Dose. Of kousso, ¼ oz. to ½ oz. for an adult; ⅛ oz. to ¼ oz. for a child. Of the infusion (including the infused flowers), 4 fl. oz. to 8 fl. oz. unstrained

MYRTACEÆ.

CARYOPHYLLUM. Clove. The dried unexpanded flower-bud of Eugenia Caryophyllata, the Clovetree (Caryophyllus aromaticus), growing in the East Indian Islands, Penang, Bencoolen, and Amboyna.

OLEUM CARYOPHYLLI. Oil of Cloves. The oil distilled in Britain from cloves.

Description. The *clove* is small, tapering nail-like, about six lines long, consisting of a four-toothed calyx, between which the unopened corolla is seen as a round ball; of a dark reddish-brown colour, and hot taste. It emits oil when indented. The *oil* is light yellow when fresh, gradually becoming red-brown, from a resinous change in the eugenic acid, sp. gr. 1·055 to 1·060, and has the odour and burning taste of the clove. It is one of the few volatile oils heavier than water.

Prop. & Comp. Cloves, besides the *volatile oil*, contain *resin*, *tannin*, and woody fibre. The volatile oil consists of a *hydrocarbon* ($C_{10}H_{16}$), holding in solution *eugenic acid* ($C_{10}H_{12}O_2$), and a crystallisable body, *caryophyllin* ($C_{10}H_{16}O$), isomeric with camphor; and lastly, *eugenin*, probably isomeric with eugenic acid.

Off. Prep. **Infusum Caryophylli.** *Infusion of Cloves.* (Bruised cloves, a quarter of an ounce; boiling distilled water, ten fluid ounces.)

Cloves are also contained in infusum aurantii compositum; mistura ferri aromatica; and vinum opii.

Therapeutics. Cloves and the oil are stimulant, aromatic, and carminative; employed in atonic dyspepsia, to allay vomiting in pregnancy, and to relieve flatulence. The oil may be used as an adjunct to purgatives; or locally, to arrest the pain of carious teeth.

Dose. Of the powdered clove, 5 gr. to 20 gr., or more; of the infusion, 1 fl. oz. to 4 fl. oz.; of the oil, 1 min. to 4 min., or more.

Incompatibles. Solutions containing cloves strike black with salts of iron, on account of the tannin they contain.

PIMENTA. Pimento. The unripe fruit of Pimenta Officinalis (Eugenia pimenta), the Pimento or Allspice Tree; growing in the West Indian Islands.

OLEUM PIMENTÆ. Oil of Pimento. The oil distilled from the fruit in Britain.

Description. Pimento is a small round two-celled berry, rather larger than pepper; brown and rough on the surface, crowned with the teeth of the calyx, and containing two seeds; of an aromatic odour, and hot, aromatic taste, resembling cloves.

Prop. & Comp. The *volatile oil*, yellow, heavier than water, consists of two portions, like that of cloves, with which it appears to be identical; besides which allspice contains a fixed oil, *resin*, *tannic acid*, and less important ingredients. The cortical portion is the most active.

Off. Prep. **Aqua Pimentæ.** *Pimento Water.* (Pimento, bruised, fourteen ounces; water, two gallons. Let a gallon distil.)

Therapeutics. The same as cloves.

Dose. Of the powder, 5 gr. to 20 gr., or more; of pimento water, 1 fl. oz. to 2 fl. oz.; of the oil, 1 min. to 4 min.

OLEUM CAJUPUTI. Oil of Cajuput. The oil distilled from the leaves of Melaleuca minor, or Cajuput Tree; growing in the Molucca Islands. The oil is imported from Batavia and Singapore.

Description. A very transparent mobile oil, of a fine pale bluish-green colour, with a strong camphoraceous and cardamom-like odour and taste; a small quantity only is yielded by the leaves.

Prop. & Comp. Sp. gr. 0·925; when distilled, at first a colourless oil passes over, which is the hydrate of cajuputene ($C_{10}H_{16},H_2O$), and constitutes about two-thirds of the crude oil.

Off. Prep. **Spiritus Cajuputi.** *Spirit of Cajuput.* (Oil of cajuput, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

Therapeutics. A powerful topical and general stimulant and antispasmodic, employed in flatulent colic, hysteria, and cholera; also in chronic rheumatism and low states of the system. Externally, when mixed with olive oil, it is used over chronic rheumatic and gouty parts. It is contained in linimentum crotonis.

Dose. 1 min. to 4 min., or more; of spirit of cajuput, ½ fl. drm. to 1 fl. drm., or more.

Adulteration. Copper has been detected in certain samples, but is not essential to the green colour of the oil. Camphor, dissolved in oil of rosemary, and coloured by copper, is said to have been substituted for the genuine oil.

EUCALYPTI FOLIA. The leaves of Eucalyptus globulus, the Blue Gum tree. Native of Tasmania. Cultivated in Southern Europe, Algeria, &c. (Not official, but yielding oil of eucalyptus, which is official.)

OLEUM EUCALYPTI. Oil of Eucalyptus. The oil distilled from the fresh leaves of Eucalyptus globulus, Eucalyptus amygdalina, and probably other species of Eucalyptus.

Description. The leaves of the full-grown tree are short-stemmed, smooth, entire, ensiform, six to twelve inches long, half-an-inch to one inch in breadth; glaucous when fresh, yellowish-green and coriaceous when dry; held up to the light, they are seen to be studded with oil-glands. Odour faintly camphoraceous, taste rather bitter and pungent. The leaves of the young plant differ in form and colour from those of the full-grown tree; they are said to be useless for pharmaceutical purposes, probably because their glands are imperfectly developed. For a like reason the dried leaves are less effectual than fresh ones.

Oil of Eucalyptus or Eucalyptol is contained in the glands above-mentioned, and is a colourless or pale straw-coloured liquid, which becomes darker and thicker by exposure; it has a characteristic aromatic odour, somewhat resembling that of cajuput oil, a spicy, pungent and cooling taste, and a neutral reaction.

Prop. & Comp. Sp. gr. of the oil is about 0·900; it is soluble in about an equal weight of alcohol. Like most substances of the kind, it probably consists of two portions: a simple hydrocarbon and an oxidised product, the proportion of the latter increasing with age.

No trace of any of the cinchona alkaloids can be detected in the bark or leaves. (Broughton.)

Off. Prep. **Unguentum Eucalypti.** *Ointment of Eucalyptus.* (Oil of eucalyptus, by weight, one ounce; soft paraffin, and hard paraffin, of each two ounces.)

Therapeutics. There seems to be adequate evidence to show that plantations of this tree have the power of rendering malarious districts healthy. This probably is due to the draining power of the roots, which suck up the moisture from the soil, and not, as has been supposed, to any impregnation of the air with balsamic vapours.

The therapeutic value of the leaves depends on the volatile oil which they contain. Binz and Siegen have shown that the antiseptic power of *eucalyptol* is greater than even that of quinine. It lowers reflex excitability by acting on the cord and its prolongations. It reduces the temperature of the body somewhat in health, and has a very decided antipyretic influence on septic fever produced artificially in dogs.

It is excreted by the lungs and kidneys, the breath retaining the odour for some hours after administration. Like turpentine, it causes a smell of violets in the urine.

A tincture, prepared by bruising 100 parts of the fresh leaves in a mortar with 200 parts of rectified spirit, has been highly recommended as a febrifuge in the treatment of intermittent fever. It has also been employed as a stimulant and antispasmodic. The leaves have been smoked to relieve asthma, bronchitis, and whooping-cough.

Eucalyptol has been employed in surgery for its antiseptic properties, but may cause local irritation. It has also been used as an inhalation in ozœna, bronchitis, phthisis, and diphtheria, and is highly spoken of as a hypodermic injection in the treatment of pyæmia.

Dose. Of the oil, 1 min. to 4 min.; of the tincture above-mentioned (not official), 30 min. to 2 fl. drm., or more. In intermittent fevers, a full dose of the tincture should be given two hours before the paroxysm.

The gum which exudes from the bark of EUCALYPTUS RESINIFERA and other species has been employed for its astringent properties under the name of Botany Bay Kino. It resembles catechu or kino in its properties and composition.

GRANATI RADICIS CORTEX. Pomegranate Root Bark. The dried bark of the root of Punica granatum; growing on the shores of the Mediterranean; chiefly imported in the dried state from Germany.

Description. The *root-bark* occurs in thin quilled pieces, of a yellowish-grey colour externally, yellow within, having a short fracture, slight odour, and bitterish but astringent taste.

Prop. & Comp. The root-bark contains about 20 per cent. of *tannin*, and two liquid alkaloids, *pelletierine*, and *isopelletierine*, upon which the activity of the drug is said to depend.

Off. Prep. **Decoctum Granati Radicis.** *Decoction of Pomegranate Root.* (Pomegranate root bark, sliced, two ounces; distilled water, forty fluid ounces. Boil down to twenty fluid ounces, and strain.)

Therapeutics. The pomegranate root bark, which is slightly astringent, has been employed for the expulsion of tape-worms; several doses are often required, and have to be followed by a purgative; it is far less efficacious than the extract of male fern.

Dose. Of decoction, 2 fl. oz. to 4 fl. oz., or more.

CUCURBITACEÆ.

COLOCYNTHIDIS PULPA. Colocynth Pulp. The dried peeled fruit, freed from the seeds, of Citrullus colocynthis, Colocynth Gourd; a plant growing on the shores of the Mediterranean and India; imported chiefly from Smyrna, Trieste, France, and Spain.

Description. The fruit was formerly imported from Mogador unpeeled, now only from the Mediterranean ports peeled. It consists of more or less broken balls, about two inches or less in diameter; the rind, when present, is hard and yellow; the pulp is whitish, porous or spongy, tough, and encloses the seeds, which form about 72 per cent. of its weight, and are ordered to be removed.

Prop. & Comp. Intensely bitter; contains a glucoside, *colocynthin* ($C_{56}H_{84}O_{23}$), capable of being crystallised; soluble in water, alcohol, and ether; decomposed by boiling with acids into glucose and a resin ($C_{40}H_{54}O_{13}$).

Off. Prep. **Extractum Colocynthidis Compositum.** *Compound Extract of Colocynth.* (Colocynth pulp, six ounces; extract of Socotrine aloes, twelve ounces; resin of scammony, four ounces; curd soap in powder, three ounces; cardamom seeds in fine powder, one ounce; proof spirit, one gallon. Prepared by macerating the colocynth in proof spirit, mixing the solution thus made with the extract of aloes, scammony, and soap, distilling off the spirit, and reducing the residue in a water-bath to a pilular consistence, adding the cardamoms towards the end of the process.)

Pilula Colocynthidis Composita. *Compound Colocynth Pill.* (Colocynth pulp, one ounce; Barbadoes aloes, two ounces; resin of scammony, two ounces; sulphate of potassium, a quarter of an ounce: all in powder; oil of cloves, two fluid drachms; distilled water, a sufficiency.)

Pilula Colocynthidis et Hyoscyami. *Pill of Colocynth and Henbane.* (Compound colocynth pill, two ounces; extract of henbane, one ounce.)

Therapeutics. Colocynth is a drastic purgative, producing watery evacuations, and stimulating powerfully the pelvic organs; when given alone it is apt to gripe, by producing irregular peristaltic movements, and hence it is usually given in conjunction with other purgatives and carminatives; in which combination it imparts great briskness of action. It is employed in obstinate and habitual constipation, febrile conditions, and to relieve the portal system in dropsical effusions, amenorrhœa and other uterine obstructions; also as a derivative in head affections. The compound extract and pill are efficient combinations, and the compound pill with henbane is found to act efficiently and with less griping from the addition of the latter drug, which not only makes the vermicular movement of the intestines more uniform, but even increases the purgative action. In very large doses, colocynth produces inflammation of the intestines.

Dose. Of the powdered pulp, 2 gr. to 8 gr.; of the compound extract, 3 gr. to 10 gr.; of compound colocynth pill, 5 gr. to 10 gr.; of pill of colocynth and henbane, 5 gr. to 10 gr.

Adulteration. The extract is not unfrequently made with the pulp and seeds, which yield a larger, but less active product; the use of the pulp free from seeds should be strictly adhered to in making the official preparations.

ECBALLII FRUCTUS. Squirting or Wild Cucumber Fruit; the fruit, very nearly ripe, of Ecballium Elaterium, growing in Greece and southern parts of Europe; also cultivated in Britain.

ELATERIUM. Elaterium. A sediment from the juice of the fruit of the Squirting Cucumber.

ELATERINUM. Elaterin, $C_{20}H_{28}O_5$. The active principle of elaterium.

Description. The fruit of Ecballium officinarum is a small elliptical pepo, about 1½ inch long, covered with soft prickles, containing the seeds surrounded by a juicy tissue: these, when ripe, are expelled forcibly, hence the English name of the plant. *Elaterium* itself occurs in the form of thin flattened or slightly incurved pieces about $\frac{1}{10}$ inch thick; light, friable; of a green colour when fresh, becoming grey on exposure to light; the fracture is finely granular; odour faint, tea-like, taste bitter and acrid.

Elaterin occurs in small colourless crystals, neutral in reaction, and with a bitter taste.

Prep. *Elaterium* is prepared by cutting the fruit lengthwise, and lightly pressing out the juice, which is strained through a hair sieve; the expressed juice is set aside to deposit; the sediment poured on a linen filter and dried on porous bricks at a gentle heat. This was formerly called the extract.

Elaterin may be obtained by exhausting elaterium with chloroform, precipitating with ether, washing the precipitate with ether, and purifying by recrystallisation from chloroform.

Prop. & Comp. Elaterium contains an active principle, *elaterin* ($C_{20}H_{28}O_5$), sparingly soluble in alcohol, but insoluble in water or ether, and forming in good elaterium from 20 to 25 per cent.; also a *green resinous matter*, soluble in ether, probably chlorophyll, together with woody fibre, &c.

Elaterin, heated with access of air, first melts and then burns, leaving no residue. Dissolved in melted carbolic acid the solution gives a crimson colour with sulphuric acid, rapidly changing to scarlet. Elaterin is not precipitated from solution by tannic acid, nor by the salts of mercury and platinum, showing it has not the properties of an alkaloid.

Off. Prep. **Pulvis Elaterini Compositus.** *Compound Powder of Elaterin.* (Elaterin, five grains; sugar of milk, one hundred and ninety-five grains.) One grain of elaterin in forty grains of the powder.

Therapeutics. A very powerful drastic hydragogue purgative, used chiefly in dropsical affections, especially those connected with cardiac disease; it sometimes causes nausea and great depression, hence should be carefully administered. Elaterium and elaterin are apt to produce gastro-enteritis if incautiously given. It is said that elaterin, convolvulin, and some other purgative principles are unable to exercise their evacuant powers unless they are brought into contact with the bile, almost the only fluid in the body capable of dissolving them.

Dose. Of elaterium (good), $\frac{1}{16}$ gr. to $\frac{1}{2}$ gr.; of the compound powder of elaterin, $\frac{1}{2}$ gr. to 5 gr.; of elaterin, $\frac{1}{40}$ gr. to $\frac{1}{10}$ gr.

Adulteration. Elaterium is often very inferior, containing starch or flour, also chalk, and but little elaterin, often not more than 4 to 6 per cent. It should not give a blue colour with iodine, nor effervesce when an acid is added. It yields half its weight to boiling rectified spirit; and when this solution is concentrated and added to a warm solution of potash, at least 20 per cent. of crystallised elaterin should be precipitated on cooling. The green colouring matter is soluble in the alkaline solution, but the elaterin is insoluble. *Elaterin* has been introduced into the Pharmacopœia owing to the difficulty of obtaining elaterium of constant strength.

UMBELLIFERÆ.

CONII FOLIA. Hemlock Leaves. The fresh leaves and young branches of Conium maculatum, spotted Hemlock; gathered from wild British plants when the fruit begins to form.

CONII FRUCTUS. Hemlock Fruit. The fruit of the same plant, gathered when fully developed, but while still green, and carefully dried.

Description. The *leaves* are decompound, smooth, arising from a smooth stem with dark purple spots; they are deep green, shining, tripinnate, with pinnatifid leaflets, petioles furrowed and sheathing at the base, those of the lower leaves hollow. The *fruit* is broadly ovate, compressed laterally, usually consisting of the separated mericarps, and distinguished from other umbelliferous fruits by having five crenated ridges and no evident vittæ.

Prop. & Comp. The leaves, when fresh, have a peculiar odour, due to the presence of a *volatile oil.* Both leaves and fruit contain *Conine* ($C_8H_{15}N$), a liquid volatile alkaloid, in combination with an acid. Conine is colourless when pure; has a strong, characteristic odour, which has been compared to that of mice; sp. gr. ·87; soluble in ether and alcohol; slightly soluble in water, with which it combines. It produces a greasy stain on paper, which disappears entirely when warmed. The conine is always associated with a variable proportion of *Methyl-conine* (C_8H_{14},CH_3,N), a base closely resembling it in physical properties. Hemlock also contains a small quantity of another base, *Conhydrine* ($C_8H_{15}N,H_2O$), which sublimes in colourless needles and is strongly alkaline. The vapour of conine is inflammable. The alkaloid is set free from its combination in the plant by potash, when it may be distilled and recognised by its odour and the fumes it gives with hydrochloric acid. Commercial conine is never free from methyl-conine, and may contain it in considerable proportion.

Off. Prep.—Of Conium (leaves).

Cataplasma Conii. *Hemlock Poultice.* (Juice of hemlock, one fluid ounce; linseed meal, four ounces; boiling water, ten fluid ounces.)

Extractum Conii. *Extract of Hemlock.* (Prepared in the same manner as the other green extracts.)

Pilula Conii Composita. *Compound Pill of Hemlock.* (Extract of hemlock, two and a half ounces; ipecacuanha, in powder, half an ounce; treacle, a sufficiency.)

Succus Conii. *Juice of Hemlock.* (The expressed juice of the fresh leaves and young branches, with one part of rectified spirit added to every three parts of the juice.)

Vapor Coninæ. *Inhalation of Conine.* (Juice of hemlock, half a fluid ounce; solution of potash, a fluid drachm; distilled water, one fluid ounce. Mix. Put twenty minims of the mixture on a sponge in an inhaler containing hot water.)

Of the Conium Fruit.

Tinctura Conii. *Tincture of Hemlock.* (Hemlock fruit, bruised, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. The physiological effects of hemlock are due to the conine and methyl-conine it contains. These alkaloids being very volatile and liable to become decomposed, the strength of the various preparations of the plant is in the highest degree uncertain. Moreover the quantitative relation of the two alkaloids to each other seems to be exceedingly variable; not an unimportant circumstance, since their actions, though similar, are not identical.

The chief effect of conine is paralysis of the voluntary muscles. This is due to a selective action, similar to that of curare, on the end-organs of the motor nerves, and later it paralyses the motor centres in the brain and spinal cord; the sensory centres in the spinal cord and brain, the muscular tissue, and the afferent nerves remain unaffected. The respiratory muscles are gradually enfeebled, and death results by asphyxia from their ultimate paralysis. The action of the heart is not directly interfered with; it may continue to beat after all respiratory movements have ceased.

But this, the action of pure conine, is considerably modified by the invariable association of methyl-conine with it. The latter alkaloid, as the researches of Fraser and Crum-Brown have shown, is equal to conine in lethal energy; but its action is not limited to the end-organs of the motor nerves; it exerts a specific influence on the cord as well, first exalting, then abolishing its reflex function. Commercial conine was found to exhibit spinal-stimulant and spinal-depressant actions in addition to its proper effect on the motor nerves. Inasmuch, however, as those actions were less marked in proportion to the freedom of the drug from methyl-conine, Fraser and Crum-Brown conclude that the spinal symptoms are wholly due to the latter alkaloid and that pure conine would confine its action to the terminations of the motor nerves. The tetanoid spasms, antecedent to the paralysis in point of time, which occur in some warm-blooded animals poisoned by conium, are therefore, in all likelihood, caused by the methyl-conine. According to Brunton, methyl-conine causes paralysis of reflex action; dimethyl-conine and conhydrine have an action similar to that of conine, but are less active.

A full dose of any active preparation of conium, given to a healthy man, causes weakness of the legs and staggering gait. The third nerve is early implicated, dilatation of the pupils and ptosis resulting. The cerebral functions are not interfered with; sensation is retained: the heart and pulse are unaffected. The muscular weakness increases; drowsiness comes on, followed by sleep; coldness of the extremities, pallor and nausea are not unfrequently present. The drug may be taken for months, without causing any disturbance of digestion.

Conium is well fitted to allay muscular spasm in chorea, paralysis agitans, mercurial tremor, and the violent twitching of the legs which sometimes occurs in paraplegia. It is useless in tetanus and strychnine poisoning. It has been employed to relieve cough in bronchitis, pertussis, and phthisis; for such purposes the Vapor Coninæ is adapted. It was at one time held to be a remedy for cancer; it often alleviates the disease, by allaying pain and improving the general health; it may be applied to the diseased surface in the form of poultice. It has also been recommended in the paroxysms of acute mania.

The author has made many observations on the action of conium, the results of which were brought before the Royal College of Physicians in 1864. He showed that the tincture, both of the leaves and fruit, might be given in very large doses, from half to one fluid ounce, with impunity.

Dose. Of the powdered leaf, 2 gr. to 8 gr., or more; of the extract, 2 gr. to 6 gr., or more; of the compound pill, 5 gr. to 10 gr.; of the juice of hemlock, 30 min. to 1 fl. drm. or more; of the tincture, 20 min. to 1 fl. drm., or more. For use of inhalation, see Vapor Coninæ.

ASAFŒTIDA. The gum resin exuding, after incision, from the living root of Ferula Narthex (Narthex asafœtida); a native of Persia, Affghanistan, and the Punjaub; of Ferula Scorodosma, and probably of other species.

Description. Generally in masses of agglutinated tears, rarely in separate tears; moist or dry. The masses, when cut, are amygdaloid in appearance, consisting of the harder whitish tears, with softer brownish-red uniting matter; on exposure asafœtida becomes pink, then dark red, and finally dull yellowish-brown; its odour is very strong and alliaceous; taste bitter, acrid, and alliaceous.

Prop. & Comp. Asafœtida contains *volatile oil*, about 4 per cent., consisting of sulphide of allyl [$(\mathbf{C}_3\mathbf{H}_5)_2\mathbf{S}$], *resin* 65 per cent., *gum* 25 per cent., and some saline matters. When rubbed with water, the gummy matters dissolve, and the resin and volatile oil are suspended, hence an emulsion is formed. When touched with nitric acid the freshly fractured surface of a tear assumes a fine green colour for a short time. From 50 to 60 per cent. of asafœtida should be soluble in rectified spirit.

Off. Prep. **Enema Asafœtidæ.** *Enema of Asafœtida.* (Asafœtida, thirty grains; water, four fluid ounces.)

Pilula Aloes et Asafœtidæ. *Pill of Aloes and Asafœtida.* (Socotrine aloes, in powder, one ounce; asafœtida, one ounce; hard soap, in powder, one ounce; confection of roses, about one ounce, or a sufficiency.)

Pilula Asafœtidæ Composita. *Compound Pill of Asafœtida.*
Synonym. Pilula Galbani Composita.
(Asafœtida, two ounces; galbanum, two ounces; myrrh, two ounces; treacle by weight, one ounce.)

Spiritus Ammoniæ Fœtidus. *Fetid Spirit of Ammonia.* (Asafœtida, one ounce and a half; strong solution of ammonia, two fluid ounces; rectified spirit, a sufficiency. Macerate the asafœtida in fifteen ounces of the spirit for twenty-four hours, distil off the latter, add the solution of ammonia, and then sufficient spirit to make one pint.) Sp. gr. about 0·847.

Tinctura Asafœtidæ. *Tincture of Asafœtidæ.* (Asafœtida in small fragments, two ounces and a half; rectified spirit, a sufficiency. Macerate the asafœtida in fifteen fluid ounces of the spirit for seven days, in a closed vessel, filter, and add sufficient rectified spirit to make one pint.)

Therapeutics. Asafœtida acts on the nervous system as a stimulant and powerful antispasmodic, and is especially useful in hysterical convulsive affections; likewise in pertussis, asthma, and other nervous diseases; in tympanitis it may be administered as an enema. It is useful also as an expectorant in some forms of chronic bronchitis.

The author is inclined, from the result of much observation, to regard asafœtida as a valuable remedy; far above all other ordinary antispasmodics; and he thinks the value of the drug is chiefly due to the sulphur oil contained in it. The resin probably acts as a stimulant expectorant. Galbanum and ammoniacum are devoid of the sulphur oil, and possess little or no true antispasmodic power when given alone, not more than myrrh or other resinous matters.

Dose. Of the gum resin, 5 gr. to 20 gr., or more; of the tincture, ½ fl. drm. to 1 fl. drm., or more; of pill of aloes and asafœtida, 5 gr. to 10 gr.; of compound pill of asafœtida, 5 gr. to 10 gr.; of fetid spirit of ammonia, ½ fl. drm. to 1 fl. drm.

Adulteration. Mechanical impurities, as sand, stones, &c., are occasionally met with.

GALBANUM. A gum resin derived from Ferula galbaniflua, Ferula rubricaulis, and probably other species. It is probably obtained by cutting the stick a little above the root and allowing the exuded juice to solidify in the air. It comes from the Levant and India.

Description. In masses, consisting of agglutinated tears, or in separate tears, about the size of a pea; of a yellowish-brown, orange-brown, or yellowish-green colour, translucent. Harder, lighter coloured, of a less intense, and more agreeable odour than asafœtida, with a bitter, acrid and somewhat alliaceous taste.

The masses commonly contain pieces of root, stem, or other impurities, and are hard, compact and irregular in form, and rarely greenish in colour.

Prop. & Comp. Galbanum contains a *volatile oil* devoid of sulphur, and a gum resin, which can be made to yield umbelliferone.

Off. Prep. **Emplastrum Galbani.** *Galbanum Plaster.* (Galbanum, one ounce; ammoniacum, one ounce; yellow wax, one ounce; lead plaster, eight ounces.)

Galbanum forms an important ingredient in pilula asafœtidæ composita.

Therapeutics. Supposed to act as asafœtida, but to be much less powerfully antispasmodic. Galbanum is probably more allied to ammoniacum in its action, and may be given as a stimulating expectorant; it is supposed to act upon the uterus as a stimulant, and has been used in amenorrhœa. Externally it is slightly stimulating, and is applied to indolent tumours, with an idea of its possessing discutient powers.

Dose. Of the gum resin, 10 gr. to 30 gr., or more.

AMMONIACUM. Ammoniacum. A gum-resinous exudation from the stem of Dorema ammoniacum, indurated by the air; growing in Persia and the Punjaub. It exudes from punctures in the plant made by beetles.

Description. In separate tears, or in masses; the tears from the size of a coriander fruit to that of a cherry, pale yellowish-brown externally when fresh, but with age deepening to a pale cinnamon-brown colour, fracture smooth, white and opaque, but becoming yellow on exposure; the masses are composed of agglutinated tears presenting an amygdaloid appearance, very similar to some specimens of gum benzoin; ammoniacum is brittle when cold, but softens readily with heat; its odour is slight but peculiar; taste bitter and rather acrid; it forms a milky emulsion when rubbed with water. It is coloured yellow by caustic potash; and a solution of chlorinated soda gives it a bright orange hue.

Prop. & Comp. *Resin* about 70 per cent., *gum* 20 per cent., *volatile oil* 4 per cent. When rubbed with water the resin and oil are suspended by the dissolved gum. The oil differs from that of asafœtida in not containing sulphur.

Off. Prep. **Emplastrum Ammoniaci cum Hydrargyro.** *Ammoniacum and Mercury Plaster.* (Ammoniacum, twelve ounces; mercury, three ounces; olive oil, fifty-six grains; sulphur, eight grains.)

Mistura Ammoniaci. *Ammoniacum Mixture.* (Ammoniacum, in coarse powder, a quarter of an ounce; distilled water, eight fluid ounces.)

Ammoniacum is also contained in pilula scillæ composita, pilula ipecacuanhæ cum scilla, and emplastrum galbani.

Therapeutics. Ammoniacum in large doses is apt to cause nausea; when it is absorbed, its action appears to be chiefly directed to the mucous membranes, more especially of the bronchial tubes; it is a powerful stimulating expectorant, and is very serviceable in some cases of chronic bronchitis, when unattended with febrile disturbance. Ammoniacum possesses very little action upon the nervous system, and therefore cannot be substituted for asafœtida.

When applied externally, it acts as a local irritant, and the ammoniacum and mercury plaster sometimes causes a papular, or even a pustular eruption; ammoniacum is often used to cause the dispersion of indolent tumours, and to diminish chronically enlarged joints.

Dose. Of the gum resin, 10 gr. to 20 gr. or more; of the mixture, ½ fl. oz. to 1 fl. oz.

ANISI FRUCTUS. Anise Fruit. The dried fruit of Pimpinella Anisum, or Anise; growing throughout Europe.

OLEUM ANISI. Oil of Anise. The oil distilled in Europe from the fruit of Pimpinella Anisum, or Anise; or in China from the fruit of Illicium Anisatum, Star-Anise (Nat. Ord. Magnoliaceæ).

Description. Anise fruits average about ⅕-inch in length, with the exception of the Russian variety, which is shorter; they are ovoid-oblong, greyish-brown, and covered with short hairs. Each mericarp has five slender ridges, with three vittæ in each channel. Odour agreeable and aromatic, taste sweet and spicy. Anise oil is colourless or very pale yellow, with taste and odour like the fruit. Ordinary oil of anise congeals at temperatures between 50° and 60° F. (10° to 15°·5 C.), and may remain solid at 62° or 63° F. (16°·7 to 17°·2 C.); oil of star-anise only becomes solid at a few degrees above the freezing point of water.

Prop. & Comp. Oil of Anise consists of two portions, about ⅕th being a liquid oil, isomeric with oil of turpentine ($C_{10}H_{16}$), and ⅘ths being an oil which solidifies slightly below the ordinary atmospheric temperature.

Off. Prep. **Aqua Anisi.** *Anise Water.* (Anise fruit, bruised, one pound; water, two gallons. Distil one gallon.)

Essentia Anisi. *Essence of Anise.* (Oil of anise, one fluid ounce; rectified spirit, four fluid ounces.)

Oil of anise is contained in tinctura camphoræ composita, and tinctura opii ammoniata.

Therapeutics. Stimulant, aromatic, and carminative; used to relieve flatulence, and to diminish the griping of purgative medicines.

Dose. Of the oil, 1 min. to 4 min.; of the essence, 10 min. to 20 min.

FŒNICULI FRUCTUS. Sweet Fennel Fruit. The fruit of Fœniculum Capillaceum (Fœniculum Vulgare), Fennel; grows in most parts of Europe, imported from Malta.

Description. The fruit is about ⅕ to ⅖ inch long, elliptical, slightly curved, capped by a conspicuous stylopod and two styles; the fruit is readily separated into its two mericarps, each of which has five prominent ridges, of which the lateral are the broadest, and four vittæ in the grooves, and two on the commissure. Greenish-brown or brown in colour; odour aromatic; taste aromatic, sweet, and agreeable.

Prop. & Comp. The fruit contains an oil with the same characteristic odour, and of a light yellow colour. This oil, which is the active ingredient, is the same as oil of anise (*quod vide*).

Off. Prep. **Aqua Fœniculi.** *Fennel Water.* (Fennel fruit, bruised, one pound; water, two gallons. Distil one gallon.)

Fennel fruit is also contained in the compound powder of liquorice.

Therapeutics. Stimulant, aromatic, and carminative; used to relieve flatulence and diminish griping.

Dose. Of fennel water, 1 fl. oz. to 2 fl. oz.

CORIANDRI FRUCTUS. Coriander Fruit. The ripe dried fruit of Coriandrum sativum, Coriander; native of Italy; cultivated in Britain, and naturalised in most parts of Europe.

OLEUM CORIANDRI. Oil of Coriander. The oil distilled in Britain from coriander fruit.

Description. The fruit is of globular form, beaked, finely ribbed, yellowish-brown, nearly as large as white pepper, consisting of two adherent mericarps, which are readily separated; odour and taste, aromatic. The oil is pale yellow or colourless.

Prop. & Comp. The *oil*, which is the active ingredient, has the odour of coriander; it is a mixture of several oils, chiefly a volatile oxygenated, and a less volatile non-oxygenated oil.

Off. Prep. Coriander is an ingredient of the following compound preparations of the Pharmacopœia, confection of senna, syrup of rhubarb, tincture of rhubarb, and tincture of senna.

The oil is contained in syrup of senna.

Therapeutics. Stimulant, aromatic, and carminative; rarely given alone.

Dose. Of the oil, 1 min. to 4 min.; of the powdered fruit, 10 gr. to 30 gr., or more.

CARUI FRUCTUS. Caraway Fruit. The dried fruit of Carum Carui, or Caraway: cultivated in England and Germany.

OLEUM CARUI. Oil of Caraway. The oil distilled in Britain from caraway fruit.

Description. The caraway *seeds* (mericarps) are slightly curved, with fine filiform ridges, and contain a single conspicuous vitta in each channel. Colour brownish, the longitudinal ridges of a lighter colour than the intervening interstices. Odour peculiar and aromatic, and taste warm and spicy. The *oil* is colourless or pale yellow, with the odour of the fruit, and a spicy somewhat acrid taste.

Prop. & Comp. The fruit, besides the common constituents of a mericarp, yields the *volatile oil*, on the presence of which its medicinal virtues depend. The sp. gr. of the oil is 0·946; its colour is darkened by long keeping. It consists of two liquid portions, an unoxidised *carvene* and an oxidised *carvol*, identical with that obtained from oil of dill.

Off. Prep. **Aqua Carui.** *Caraway Water.* (Caraway, bruised, one pound; water, two gallons; distil one gallon.)
Caraway is contained in many official preparations.

Therapeutics. Caraway is aromatic, stomachic, and carminative, often used as a corrector of flatulence, and as an adjunct to other medicines; the oil is often added to purgative medicines to prevent griping.

Dose. Of caraway water, 1 fl. oz. to 2 fl. oz.; of the oil of caraway, 1 min. to 4 min.

ANETHI FRUCTUS. Dill Fruit. The dried fruit of Peucedaneum Graveolens (Anethum Graveolens), or Dill; cultivated in Britain, or imported from middle and southern Europe.

OLEUM ANETHI. Oil of Dill. Oil distilled in Britain from the fruit.

Description. The seeds (fruit) are of a brown colour, oval, somewhat flattened, about $\frac{1}{6}$ in. in length, convex on one side, and concave on the other; they have five primary ridges, and one vitta in each channel. The mericarps have a broad membranous border with a lighter colour. The oil is pale yellow in colour, and has an aromatic odour; taste hot and sweetish.

Prop. & Comp. Dill owes its peculiar properties to the *volatile oil.* This oil resembles in appearance that of caraway; its sp. gr. is 0·881. Its composition is probably analogous to that of the other umbelliferous oils.

Off. Prep. **Aqua Anethi.** *Dill Water.* (Bruised dill, one pound; water, two gallons, Let a gallon distil.)

Therapeutics. Stimulant, aromatic, and carminative; chiefly used in the flatulence of infants.

Dose. Of dill water, 1 fl. oz. to 2 fl. oz.; for infants, 1 fl. drm. to 2 fl. drm.; of the oil of dill, 1 min. to 4 min.

SUMBUL RADIX. Sumbul Root. Musk Root. The dried transverse sections of Ferula Sumbul (Euryangium Sumbul), a native of Bokhara. It comes through Russia and Bombay.

Description. The drug as obtained in this country is in circular pieces, consisting of transverse sections of the root from 1 to 3 inches in diameter, and from $\frac{3}{4}$ to 1 inch or more in thickness. The epidermis is of a light brown colour, wrinkled, sometimes beset with short, bristly fibres; the inner substance consists of coarse, irregular fibres, easily separated: when examined in transverse section, it presents spots of exuded resin, appears porous through the greater part of its diameter, and the bundles of fibres are seen to be loosely packed together. The odour is strong and musk-like, hence its name. That brought from India differs from the Russian, being closer in texture, more dense and firm, and of a reddish tint.

Prop. & Comp. It yields, on distillation, a *volatile oil,* and contains also a *resin* and *starch,* and likewise an acid capable of crystallisation, named *sumbulic* acid.

Off. Prep. **Tinctura Sumbul.** *Tincture of Sumbul.* Sumbul root in powder, two and a half ounces; rectified spirit, a pint.)

Therapeutics. It appears to be a nervine stimulant, similar in its action to valerian. In Russia it has been used in cholera, and febrile diseases of a typhoid or adynamic type. It has been recommended in epilepsy, chorea, and other nervous disorders, and its use is said to be attended with much benefit in cases of delirium tremens. Its action requires further investigation.

Dose. Of the tincture, 10 min. to 30 min. Sometimes the resin separated from the root, has been employed in doses of from ½ gr. upwards.

CAPRIFOLIACEÆ.

SAMBUCI FLORES. Elder Flowers. The fresh flowers of Sambus nigra; indigenous.

Description. The flowers are small, white, in five-parted cymes, having a peculiar fragrant but sickly odour.

Prop. & Comp. They yield on distillation a *volatile oil*, to the presence of which they owe their odour. Their active ingredients are soluble in water; no peculiar crystallisable principles have been obtained from them; they contain ingredients common to most flowers.

Off. Prep. **Aqua Sambuci.** *Elder-Flower Water.* (Fresh elder flowers, or an equivalent quantity of the flowers preserved while fresh with common salt, ten pounds; water, two gallons. Let a gallon distil.)

Dose. Of elder-flower water, 1 fl. oz. to 2 fl. oz.

Therapeutics. The flowers are gently stimulant in their action, and are used as a topical application, in the form of ointment, made by heating the flowers in hot lard; the water is employed as a pleasant vehicle for the exhibition of medicines or for lotions. The inner bark of the elder tree possesses hydragogue and cathartic powers, and has been used with success to remove the fluid in dropsies. It may be given in the form of decoction, the strength being about four ounces to the pint; of this, two to four fluid ounces may be given as a dose.

CINCHONACEÆ.

CINCHONÆ CORTEX. Cinchona Bark. The bark of Cinchona Calisaya; Cinchona Officinalis; Cinchona Succirubra; Cinchona Lancifolia, and other species of Cinchona containing the peculiar alkaloids of the bark. Collected in the north-western and western regions of South America.

CINCHONÆ RUBRÆ CORTEX. Red Cinchona Bark. The bark of the stem and branches of *cultivated* plants of Cinchona Succirubra. Cultivated in Java, India, Ceylon, and Jamaica.

QUININÆ SULPHAS. Sulphate of Quinine. $[(C_{20}H_{24}N_2O_2)_2, H_2SO_4]_2, 15H_2O$. The sulphate of an alkaloid prepared from the powder of various kinds of Cinchona and Remijia bark.

QUININÆ HYDROCHLORAS. Hydrochlorate of Quinine. $C_{20}H_{24}N_2O_2, HCl, 2H_2O$. The hydrochlorate of an alkaloid obtained from the same sources as sulphate of quinine.

CINCHONIDINÆ SULPHAS. Sulphate of Cinchonidine. $(C_{20}H_{24}N_2O)_2, H_2SO_4, 3H_2O$. The sulphate of an alkaloid obtained from the bark of various species of Cinchona.

CINCHONINÆ SULPHAS. Sulphate of Cinchonine. $(C_{20}H_{24}N_2O)_2, H_2SO_4, 2H_2O$. The sulphate of an alkaloid obtained from the bark of various species of Cinchona and Remijia.

All the different species of Cinchona inhabit the Andes, chiefly on the eastern face of the Cordilleras, from 4,000 to 12,000 feet above the sea, and extending from 10° of North latitude to 20° of South latitude, growing therefore in Peru, Bolivia, and Columbia.

According to Dr. Karsten, the conditions favourable to the growth of cinchona are sudden and great alternations of heat and cold, moisture and dryness.

Endeavours are now being made to cultivate the more important species of cinchona plants in India (Neilgherries), Ceylon, Java, Jamaica, and Trinidad. In India the tree chiefly grown, and now rendered official, is the cinchona succirubra, which appears to grow quickly, and to thrive better than the cinchona calisaya, while the bark contains a large amount of quinine. Cinchona officinalis and cinchona lancifolia also grow well, at moderate heights, that is below 6,000 feet; their barks are also very rich in alkaloids, of which quinine forms nearly one half.

Description. Cinchonæ rubræ cortex, red bark, from cultivated plants of cinchona succirubra, occurs in quills, or more or less incurved pieces, varying in length from a few inches to a foot or more ; the bark itself is from about $\frac{1}{10}$ to $\frac{1}{4}$ in. thick, rarely more ; the outer surface is rough from longitudinal ridges and furrows, or transverse cracks, annular fissures, and warts, and brownish or reddish brown. Internally it is of a brick-red or deep reddish-brown colour ; rough and coarsely striated. The fracture is finely fibrous in the larger quills, short in the smaller ones. The powder is brown or reddish-brown ; the taste very bitter and somewhat astringent.

All the forms of cinchona bark above mentioned, together with some species of Remijia, are rendered official in the British Pharmacopœia, for the preparation of the alkaloids. The cultivated red cinchona bark should alone be employed in making the various official preparations of cinchona.

For the description of other cinchona barks used in commerce for the extraction of the alkaloids, the reader is referred to more extended works on the subject, especially to the article Cinchona, the last effort of the late Dr. Pereira, and to Howards' Illustrations of the Cinchona barks.

Prop. & Comp. The different barks are closely allied to each other in composition : they all contain acid and alkaline principles peculiar to the genus Cinchona, together with other matters common to many kinds of barks. The acids and alkaloids of the cinchona barks are as follows :

Quinic Acid ($C_7H_{12}O_6$) can be crystallised in oblique rhombic prisms, resembling tartaric acid in appearance ; soluble in water, and acid in taste ; less soluble in alcohol, and very sparingly soluble in ether ; it yields a yellow, crystallisable, pungent sublimate, *quinone* ($C_6H_4O_2$), when distilled with some oxidising agents. This acid is also called *chinic acid.*

Quino-tannic Acid ($C_{42}H_{30}O_{35}$?) differs from ordinary tannic acid in giving a green precipitate with the persalts of iron, and rapidly absorbing oxygen, especially when united with an alkali.

Cinchona-red, produced by the oxidation of quino-tannic acid ; a red substance, almost insoluble in water, but soluble in alcohol, ether, alkalies, and acids ; the solutions have a deep red colour.

Quinovin ($C_{30}H_{48}O_8$) an amorphous substance, nearly insoluble in water ; soluble in ether, and much more so in alcohol. It is decomposed by hydrochloric acid into quinovic acid and quinova sugar.

Quinovic Acid ($C_{20}H_{38}O_4$) found in many kinds of barks. It is produced from quinovin. It is a crystalline weak acid, sparingly soluble in alcohol and ether, insoluble in water.

Quinine ($C_{20}H_{24}N_2O_2$), with one or three equivalents of water when crystallised, the most important alkaloid contained in the barks, exists in the largest quantities in Calisaya bark; when pure, it is white, crystallising with some difficulty as the hydrate; soluble in about 350 parts of cold water, 60 parts of ether, and very soluble in alcohol; fuses, when heated, into a resinous mass; forms salts with acids, and its solutions exhibit a fluorescent appearance; when treated with excess of chlorine water, a dark emerald-green liquid is produced on the addition of ammonia. Quinine forms crystallisable salts with acids; the best known is the official salt, the sulphate of quinine; the hydrochlorate is now introduced.

Cinchonine ($C_{20}H_{24}N_2O$), an alkaloid, contained chiefly in the pale varieties of bark; it readily crystallises from its alcoholic solution in brilliant colourless four-sided prisms; it is almost insoluble in water and ether, and requires about thirty parts of rectified spirit to dissolve it; unites with acids, and forms soluble salts, the solutions of which are not fluorescent, and do not give the green colour with chlorine and ammonia, but merely become light brownish-yellow. An alkaloid has been obtained, isomeric with cinchonine, but more soluble in water, alcohol, and ether; it resembles it in most other respects.

Quinidine ($C_{20}H_{24}N_2O_2,2H_2O$), a third alkaloid, contained in many of the cinchona barks, especially in those of New Granada, is isomeric with quinine, with two equivalents of water when crystallised; it occurs, when pure, in white prisms, readily crystallising from alcohol, and also when precipitated from the watery solutions of its salts by means of an alkali; it is very bitter, but less intensely so than quinine, and its solutions are fluorescent; it is much less soluble in water and in ether than quinine, and its sulphate is much more soluble than that of quinine, and much less so than that of cinchonine. The solutions of quinidine, when treated with chlorine water and ammonia, show the emerald-green appearance, as in the case of quinine.

Cinchonidine ($C_{20}H_{24}N_2O$), a fourth alkaloid, found in cinchona barks, isomeric with cinchonine, occurs in hard, brilliant, striated, rhomboidal prisms, which are anhydrous and almost insoluble in ether ; it forms crystallisable salts ; the solutions are fluorescent, but when treated with chlorine water, and subsequently with ammonia, do not give rise to the emerald-green colour.

M. Pasteur, from an examination of *quinine*, *quinidine*, *cinchonine*, and *cinchonidine*, finds that *quinine*, by being carefully heated in the form of a salt, as the tartrate, is changed into an isomeric body, *quinicine*, and *cinchonine*, under like circumstances, into *cinchonicine*, substances similar to them, but amorphous ; and he also finds that *quinidine* and *cinchonidine* are converted into the same isomeric substances, *quinicine* and *cinchonicine*. According to Pasteur, *quinine* and *quinidine* strike green with chlorine and ammonia, but *cinchonine* and *cinchonidine* do not, and the alkaloid usually designated *quinidine* commonly consists chiefly of *cinchonidine*.

The following are the relations in which the four alkaloids and their isomeric modifications stand in regard to their action upon polarised light :—

Quinine turns the plane of polarisation powerfully to the left hand.
Cinchonidine ,, ,, ,, ,,
Cinchonine turns the plane of polarisation strongly to the right hand.
Quinidine ,, ,, ,, ,,
Both quinicine and cinchonicine turn the plane of polarisation feebly to the right hand.

An alkaloid, *aricine* ($C_{23}H_{26}N_2O_4$), was found by Pelletier in Arica bark ; it forms white prismatic crystals, of a bitter taste, but little soluble in water ; easily soluble in alcohol, less so in ether ; it is decomposed by nitric acid, forming a deep green solution.

The substance known by the name of *quinoidine* consists of resinous and colouring matters, with the above alkaloids more or less changed by the processes to which they have been subjected ; it is obtained from the liquors from which the sulphate of quinine has been crystallised ; it was from this substance that Liebig obtained his *amorphous quinine*, which bears the same relation to the crystallised alkaloid as uncrystallised syrup does to ordinary sugar ; probably it is closely allied to quinicine.

The Pharmacopœia directs that the dried bark of the cultivated plants of Cinchona succirubra, when used for purposes other than that of obtaining the alkaloids or their salts, shall yield between five and six per cent. of total alkaloids, of which not less than half shall consist of quinine and cinchonidine. [For methods of estimating the amount of alkaloids present, see p. 294.]

The official salts of the cinchona alkaloids used in medicine are as follows :—

QUININÆ SULPHAS. Sulphate of Quinine $[(\mathbf{C_{20}H_{24}N_2O_2})_2,\mathbf{H_2SO_4}]_2$, $15\mathbf{H_2O}$, occurring in snow-white feathery crystals, requiring for solution about sixty parts of strong spirit, and 750 parts of water; entirely soluble in water acidulated with sulphuric acid; the solution, treated with chlorine and ammonia, gives the green test before noticed, and also exhibits fluorescence; when the solution is treated with ammonia a white precipitate of quinine is formed, soluble in ether and in excess of ammonia. With chloride of barium it gives a white precipitate, insoluble in nitric acid. Twenty-five grains of the salt should lose 3·8 grains of water by drying at 212° F. (100° C.). For the adulterations, &c., of sulphate of quinine, see page 295.

Prep. This sulphate is prepared from the powder of the bark by extraction with spirit after the addition of lime, or by the action of an alkali on an acidulated aqueous infusion, with subquent neutralisation of the alkaloid by sulphuric acid and purification of the resulting salt.

QUININÆ HYDROCHLORAS. Hydrochlorate of Quinine $(\mathbf{C_{20}H_{24}N_2O_2,HCl,2H_2O})$ occurring in crystals similar to, but somewhat larger than those of sulphate of quinine. It is much more soluble, one part dissolving in about thirty-four parts of water, or three parts of spirit at ordinary temperatures. With chlorine water and ammonia it gives a green colour, and the presence of hydrochloric acid may be shown by the white precipitate with nitrate of silver, insoluble in nitric acid. It can be converted into the sulphate, by being dissolved with an equal weight of sulphate of sodium in ten times its weight of hot distilled water, and setting the mixture aside at 60° F. (15°·5 C.) for half an hour. Dried at a temperature of 212° F. (100° C.), it loses 9 per cent. of water.

Prep. Obtained by the same process as sulphate of quinine, the separated alkaloid being neutralised by hydrochloric acid.

CINCHONIDINÆ SULPHAS. Sulphate of Cinchonidine $(\mathbf{C_{20}H_{24}N_2O})_2,\mathbf{H_2SO_4},3\mathbf{H_2O}$, occurs in colourless silky acicular crystals. It is insoluble in water, alcohol, or ether; almost insoluble in ammonia or in chloroform; readily soluble in dilute acids. The solution in water has a bitter taste and neutral, or faintly alkaline reaction; it gives a white precipitate with a solution of tartarated soda. It dissolves in pure sulphuric acid with the production of not more than a faint yellow coloration, and the fluid undergoes no apparent change when gently warmed. Twenty-five grains of the salt lose 1·76 grains of moisture on drying at 212° F. (100° C.). An acidified solution is not distinctly fluorescent.

Prep. From the mother-liquors of the crystallisation of sulphate of quinine by further concentration; it is purified by crystallisation from alcohol and finally from hot water.

CINCHONINÆ SULPHAS. Sulphate of Cinchonine $(C_{20}H_{24}N_2O)_2, H_2SO_4, 2H_2O$, occurs in hard, colourless, short, prismatic crystals, with a vitreous lustre. It is soluble in water and in chloroform; readily soluble in rectified spirit and in dilute acids; almost insoluble in ether or in ammonia. Twenty-five grains when dried at 212° F. (100° C.) should lose 1·26 grain of moisture, and should then almost wholly dissolve in four ounces by weight of chloroform. In its taste and its reactions it corresponds with sulphate of cinchonidine, with the exception of its action on a ray of polarised light. An acidified solution is not fluorescent.

Prep. It can be prepared from the mother-liquors of the crystallisation of the sulphates of quinine, cinchonidine, and quinidine, by precipitating the alkaloid with caustic soda, washing it with spirit until free from other alkaloids, dissolving it in sulphuric acid, and, after purifying the solution with animal charcoal, allowing it to crystallise.

VALERIANATE OF QUININE (described under Valerian), CITRATE OF IRON AND QUININE (described under Iron Salts), and ARSENIATE OF QUININE are occasionally employed, but their special value is somewhat doubtful. The SULPHATE OF QUINIDINE may also be prescribed. The cinchona alkaloids also form with acids, salts which are acid in reaction; and such salts are produced when, as is usual, the ordinary sulphates are given dissolved in excess of acid. The neutral HYDROCHLORATES of QUININE and CINCHONINE are very useful when it is desired to employ neutral solutions of either of these alkaloids, for they are more soluble in pure water than any of the other commercial salts.

Tartrates, phosphates, citrates, and *tannates* of the cinchona alkaloids have been occasionally proposed as remedial agents.

Off. Prep.—Of Cinchona Bark.

Decoctum Cinchonæ. *Decoction of Cinchona.* (Red cinchona bark, in coarse powder, one ounce and a quarter; distilled water, one pint; boil for ten minutes and add water till the strained product measures one pint.)

Extractum Cinchonæ Liquidum. *Liquid Extract of Cinchona.* (Red cinchona bark, in very fine powder, twenty ounces; hydrochloric acid, five fluid drachms; glycerine, two fluid ounces and a half; rectified spirit and distilled water, of each a sufficiency. Macerate the bark with five pints of water, together with the acid and glycerine; percolate, and evaporate to twenty fluid ounces. The amount of alkaloids present should now be ascertained, and every fluid part of it containing five grains of total alkaloids is first to be brought to the volume of eighty-five grains by evaporation, or, if necessary, by dilution with water, then 12·5 fluid grains of rectified spirit are to be added, and the final adjustment of the volume to one hundred fluid grains is effected by the addition of distilled water.) The liquid extract thus prepared contains five grains of the alkaloids of the bark in every hundred fluid grains.

Infusum Cinchonæ Acidum. *Acid Infusion of Cinchona.* *Synonym.* Infusum Cinchonæ. (Red cinchona bark, in fine powder, half an ounce; aromatic sulphuric acid, one fluid drachm; boiling distilled water, ten fluid ounces. Infuse in a covered vessel for one hour and strain.)

Tinctura Cinchonæ. *Tincture of Cinchona.* (Red cinchona bark, in fine powder, four ounces; proof spirit, one pint. Prepared by maceration and percolation.)

Tinctura Cinchonæ Composita. *Compound Tincture of Cinchona.* (Red cinchona bark, in fine powder, two ounces; bitter orange peel, cut small and bruised, one ounce; serpentary rhizome, bruised, half an ounce; saffron, fifty-five grains; cochineal, in powder, twenty-eight grains; proof spirit, one pint. Prepared by maceration and percolation.)

Red cinchona bark is also contained in mistura ferri aromatica.

Of Sulphate of Quinine.

Tinctura Quininæ Ammoniata. *Ammoniated Tincture of Quinine,* (Sulphate of quinine, one hundred and sixty grains; solution of ammonia, two and a half fluid ounces; proof spirit, seventeen and a half fluid ounces.) One fluid drachm contains a grain of sulphate of quinine.

Vinum Quininæ. *Quinine Wine.* (Sulphate of quinine, twenty grains; citric acid, thirty grains; orange wine, a pint.)

Sulphate of quinine is also employed in the preparation of citrate of iron and quinine.

Of Hydrochlorate of Quinine.

Tinctura Quininæ. *Tincture of Quinine.* (Hydrochlorate of quinine, one hundred and sixty grains; tincture of orange peel, one pint.) This tincture is about one-ninth stronger in alkaloid than the corresponding tincture of the British Pharmacopœia, 1867.

Therapeutics. Cinchona barks owe their efficacy chiefly to the alkaloids contained in them, but some influence is also exercised by the cincho-tannic acid and cinchona-red, which produce a slight difference of action between the barks and the alkaloids derived from them.

Action of the Cinchona Alkaloids.

Quinine has been experimentally shewn to possess the following properties :—

1°. It is fatal to the lowest forms of animal and vegetable life. Its poisonous effect on bacteria explains its power of preventing, arresting, or retarding putrefaction.

2°. It exerts a like inhibitory action on various fermentations ; thus it hinders the solvent operation of the gastric juice, of emulsin upon amygdalin, and the vinous and butyric fermentations.

3°. It enfeebles or arrests the spontaneous movements of the colourless blood-corpuscles, and is able to check their migration from the vessels.

4°. In large doses it paralyses the heart, causing a sudden fall of blood-pressure, convulsions, and death.

5°. It has a powerful sedative influence upon the spinal cord and brain, diminishing and finally abolishing reflex movements.

6°. It lowers the heat of the body in healthy animals ; but this action is most manifest in the pyrexia artificially induced by the injection of putrilage into the circulation. It is believed to produce this result by checking oxidation within the organism. (Binz.)

Quinidine, *Cinchonine*, and *Cinchonidine*, also exhibit the three first properties enumerated above. As regards their antiseptic power, the four cinchona alkaloids are very nearly equal. Quinine and quinidine stand on the same level ; next comes cinchonidine ; last, though at no great distance, cinchonine.

Quinine is employed in medicine :—

1°. As a tonic. In small doses, it increases the appetite, especially of weak patients ; hence it improves their general health and muscular power. It also checks the colliquative sweating of extreme debility. It should not be given with food.

2°. As an antiperiodic. Quinine acts as a specific in quotidian, tertian and quartan ague, malarious remittents, miasmatic neuralgia, hepatic and splenic engorgements, &c.

3°. Quinine is able to cure or relieve certain forms of neuralgia which are *not* due to malaria. Its value seems most marked when the pain assumes a periodic character. It may be advantageously combined with alkalies and iodide of potassium, or employed simultaneously with local depletion or counter-irritation.

4°. As an antipyretic. Doses of 5 gr. to 20 gr. have a marked effect in reducing temperature in pyrexia, to whatever cause it may be due. The reduction of temperature is not permanent, but varies in duration from 1 to 48 hours. Trials were made in enteric, typhus, and rheumatic fevers, in scarlatina and pneumonia, and the hectic of phthisis. (Committee of Clin. Soc.)

5°. In acute inflammation of various tissues and organs, quinine appears to check the tendency to suppuration, apart from its action on the heat of the body.

6°. In various septic conditions of the blood, quinine in large doses has been found of great value. (Puerperal and surgical septicæmia, &c.)

7°. Quinine has been employed in the continued fevers. It is useful in combating particular symptoms, but exerts no specific action on the course of the disease: *e.g.*, it cannot prevent the relapse in relapsing fever.

8°. Externally, quinine may be applied as a stimulant and antiseptic to unhealthy ulcers; it may be used as a gargle in putrid sore throat, and as a dentifrice to spongy gums.

Large doses of quinine cause symptoms of *Quinism* or *Cinchonism;* buzzing in the ears, deafness, vertigo, wakefulness, and sometimes nausea and complete anorexia; these symptoms may mostly be relieved by giving hydrobromic acid with the quinine. The therapeutic uses of the drug, enumerated above, rest on clinical observation; any attempt to connect them with those properties which have been studied experimentally, would at present be premature.

The actions of *Quinidine*, *Cinchonine*, and *Cinchonidine*, probably resemble those of Quinine. The author has repeatedly proved that all three are capable of curing ague. He has abundant evidence to shew that peculiar effects often result from salts of Cinchonine, which are not produced by the same amount of the corresponding salts of Quinine; there is often great dryness of the mouth, and an absence of noise in the ears. As regards the comparative antiperiodic power of the four alkaloids, the Madras Cinchona Commission of 1868 reported that quinidine was equal to quinine in febrifuge action; that cinchonidine was only a little less efficacious; and that cinchonine was somewhat inferior to the other three.

The sulphates of cinchonidine and cinchonine have the advantage of being much less costly than the corresponding salt of quinine.

Action of Cinchona Bark.

Although the efficacy of bark is chiefly due to the alkaloids it contains, it possesses certain properties of its own. The *cinchotannic* acid, and *cinchona-red* are powerfully astringent—like tannic and gallic acids; and they contribute in some measure to the total effect. Bark may be employed for all the purposes for which quinine is administered; but it is least suited to such cases as require massive doses; *e.g.*, the quantity of bark needed to cut short an ague is more likely to upset the stomach than the comparatively limited bulk of the corresponding dose of alkaloid; moreover the latter, given in solution, is more quickly absorbed. On the other hand, the astringent property of bark renders it better fitted for the treatment of relaxed conditions of the habit than quinine. As a tonic, in cases of great debility with weak heart, bark is more agreeable and beneficial than quinine. In large doses, it may cause all the symptoms of Quinism.

No very well marked difference in the action of the different barks has yet been established: there can be no doubt, however, that their effects depend on the alkaloids contained in them, and consequently any peculiarity of the bark would be that of the prevailing alkaloid.

As a rule, quinine exists in large quantities in the bark of cinchona calisaya, cinchonine in the bark of cinchona officinalis; and the bark of cinchona succirubra is stated to contain about equal amounts of the two alkaloids. Quinidine and cinchonidine are more especially found in the Carthagena barks. According to the results of many examinations, collected in the form of a table by the late Dr. Pereira:—

Yellow or Calisaya barks yield from 2·5 to 3·8 per cent. of quinine.

Pale or Loxa barks from about 0·7 to 1·4 per cent. of alkaloids, chiefly cinchonine or quinidine, with a little quinine.

Best red barks, 2·6 per cent. of quinine, and 1·5 per cent. of cinchonine.

Grey or Huanuco barks, from 1·7 to 2·1 per cent. of alkaloids, chiefly consisting of cinchonine and quinidine, with occasionally some quinine.

With regard to the cultivated forms of cinchona, the red bark has the advantages of growing at a lower elevation, and of being more hardy and more easily propagated than the other varieties. It is employed on account of (i.) its larger average yield of alkaloids; (ii.) its comparative freedom from false barks; (iii.) the increasing supply which tends to render it easy to obtain bark of good quality. It contains all cinchona alkaloids except *aricine*. (Holmes.)

Dose and Mode of Administration. Of cinchona bark, in powder, 10 gr. to 60 gr.; of the decoction, 1 fl. oz. to 2 fl. oz.; of the acid infusion, 1 fl. oz. to 2 fl. oz.; of the liquid extract of cinchona, 5 min. to 10 min.; of the tinctures (simple or compound), ½ fl. drm. to 2 fl. drm.; of sulphate of quinine, 1 gr. to 10 gr., or even 20 gr.; of the ammoniated tincture, ½ fl. drm. to 2 fl. drm.; of wine of quinine, ½ fl. oz. to 1 fl. oz.; of tincture of quinine, ½ drm. to 2 drm.; of sulphate of cinchonine, 1 gr. to 10 gr.; of sulphate of quinidine, 1 gr. to 20 gr.; of sulphate of cinchonidine, 1 gr. to 10 gr.; of hydrochlorate of quinine or cinchonine, 1 gr. to 10 gr. The author for the last 25 years has been in the habit of prescribing sulphate of quinine rubbed up with citrate of potassium, and often bicarbonate of sodium and the compound tragacanth powder; he finds many patients can take quinine in this form when they cannot take the alkaloid dissolved in acids. Thus administered, quinine possesses the same antiperiodic power and does not irritate the bladder.

In intermittents, or when the dose of bark is required to be large, the salts of quinine or cinchonine are preferred; powdered bark was formerly given in such cases, but it is apt to disagree with the stomach, and cause nausea and vomiting. In the treatment of ague, quinine may be given in two ways, either in a very large dose, a short time before the expected paroxysm, or in small doses, frequently repeated during the whole of the interval between the paroxysms; sometimes the first method is at once effectual, but there is some fear of producing unpleasant symptoms of quinism; the second method is, as a rule, quite successful, and without hazard. Ague may also be treated by the hypodermic injection of the alkaloids; the dose required is much smaller, and the method is very effectual; the neutral hydrochlorates dissolved in water should be employed.

Adulteration of Cinchona Barks. Inferior non-official cinchona barks may be substituted for the official, and barks of other kinds may be sold for those of the genus cinchona; these are distinguished by their physical characters, and likewise by the presence and amount of the cinchona alkaloids contained in them. The structure of the bark also affords some test of its value, for it has been found that the bark which exhibits when fractured a homogeneous texture, with a large amount of short fusiform ligneous fibres, uniformly distributed in the cellular tissue, contains a large amount of quinine; this is the character of true Calisaya barks. Barks rich in quinine generally contain much calcium, and the strong infusions are precipitated by sulphate of sodium; which is not the case with the barks yielding cinchonine. The same holds good with regard to the amount of tannin. Many methods of ascertaining the percentage of alkaloids have been proposed; the following is the method given in the Pharmacopœia for the examination of cultivated red cinchona bark :—

For Quinine and Cinchonidine. Mix 200 grains of red cinchona bark, in very fine powder, with sixty grains of hydrate of calcium; slightly moisten the powders with half an ounce of water; mix the whole intimately in a small porcelain dish or mortar; allow the mixture to stand for an hour or two, when it will present the characters of a moist, dark brown powder in which there should be no lumps or visible white particles. Transfer this powder to a six-ounce flask, add three fluid ounces of benzolated amylic alcohol, boil them together for about half an hour, decant and drain off the liquid on to a filter, leaving the powder in the flask; add more of the benzolated amylic alcohol to the powder, and boil and decant as before; repeat this operation a third time; then turn the contents of the flask on to the filter, and wash by percolation with more of the benzolated amylic alcohol until the bark is exhausted. If, during the boiling, a funnel be placed in the mouth of the flask, and another flask filled with cold water be placed in the funnel, this will form a convenient condenser which will prevent the loss of more than a small quantity of the boiling liquid. Introduce the collected filtrate, while still warm, into a stoppered glass separator; add to it twenty minims of dilute hydrochloric acid, mixed with two fluid drachms of water; shake them well together, and when the acid liquid has separated, this may be drawn off, and the process repeated with distilled water slightly acidulated with hydrochloric acid, until the whole of the alkaloids have been removed. The acid liquid thus obtained will contain the alkaloids as hydrochlorates with excess of hydrochloric acid. It is to be carefully and exactly neutralised with ammonia while warm, and then concentrated to the bulk of three fluid drachms. If now about fifteen grains of tartarated soda, dissolved in twice its weight of water, be added to the neutral hydrochlorates, and the mixture stirred with a glass rod, insoluble tartrates of quinine and cinchonidine will separate completely in about an hour, and these collected on a filter, washed and dried, will contain eight-tenths of their weight of the alkaloids, quinine and cinchonidine, which, divided by two, represents the percentage of those alkaloids. The other alkaloids will be left in the mother-liquor.

2. *For Total Alkaloids.* To the mother-liquor from the preceding process add solution of ammonia in slight excess. Collect, wash, and dry the precipitate, which will contain the other alkaloids. The weight of this precipitate divided by two, and added to the percentage weight of the quinine and cinchonidine, gives the percentage of total alkaloids.

Adulterations of Sulphate of Quinine. On account of the high price of this salt, many adulterations have been practised. *Sulphates of cinchonine, quinidine* and *cinchonidine, salicin, sugar of milk, cane sugar, mannite, starch,* and *stearic acid,* form the most frequent organic adulterations ; and *sulphate of calcium,* precipitated to imitate the quinine salt, *chalk, magnesia,* and *boracic acid,* are among the most frequent inorganic additions. These latter, with the exception of boracic acid, are readily detected by their not dissolving in alcohol, and by heating the suspected salt on a piece of platinum foil, where they leave an ash, the nature of which can be ascertained by the ordinary tests : the organic impurities are more difficult of detection ; cinchonine, cinchonidine and quinidine can be discovered by their different solubilities in water, alcohol, and ether . salicin, by the blood-red colour produced by sulphuric acid ; the sugars, by the solution of the salt having a sweet taste after the precipitation of the alkaloids by means of an alkali ; starch, by its striking blue with iodine ; and stearic acid, by not dissolving in dilute acids. Boracic acid, if present, gives to its alcoholic solution the property of imparting a green tinge to flame. "Cuprea barks," from Columbia, have been introduced into commerce as a source of quinine ; and yield an alkaloid *cupreine.* The British Pharmacopœia gives the following quantitative tests :—

i. *Test for Cinchonidine and Cinchonine.* Heat 100 grains of the sulphate of quinine in five or six ounces of boiling water, with three or four drops of dilute sulphuric acid. Set the solution aside until cold. Separate, by filtration, the purified sulphate of quinine which has crystallised out. To the filtrate, which should nearly fill a bottle or flask, add ether, shaking occasionally, until a distinct layer of ether remains undissolved. Add ammonia in very slight excess, and shake thoroughly, so that the quinine at first precipitated shall be redissolved. Set aside for some hours or during a night. Remove the supernatant clear ethereal fluid, which should occupy the neck of the vessel, by a pipette. Wash the residual aqueous fluid and any separated crystals of alkaloid with a very little more ether, once or twice. Collect the separated alkaloid on a tared filter, wash it well with a little ether, dry at 212° F. (100° C.), and weigh. Four parts of such alkaloid correspond to five parts of crystallised sulphate of cinchonidine or of sulphate of cinchonine.

ii. *Test for Quinidine.* Recrystallise fifty grains of the original sulphate of quinine as described in the previous paragraph. To the filtrate add solution of iodide of potassium, and a little spirit of wine to prevent the precipitation of amorphous hydriodates. Collect any separated hydriodate of quinidine, wash with a little water, dry, and weigh. The weight represents about an equal weight of crystallised sulphate of quinidine.

iii. *Test for Cupreine.* Shake the recrystallised sulphate of quinine, obtained in testing the original sulphate of quinine for cinchonidine and cinchonine, with one fluid ounce of ether, and a quarter of an ounce of solution of ammonia, and to this ethereal solution, separated, add the ethereal fluid and washings also obtained in testing the original sulphate for the two alkaloids just mentioned. Shake this ethereal liquor with a quarter of a fluid ounce of a ten per cent. solution of caustic soda, adding water if any solid matter separates. Remove the ethereal solution. Wash the aqueous solution with more ether, and remove the ethereal washings. Add dilute sulphuric acid to the aqueous fluid heated to boiling, until the soda is exactly neutralised. When cold collect any sulphate of cupreine that has crystallised out on a tared filter; dry, and weigh.

"Sulphate of Quinine" should not contain much more than five per cent. of sulphates of other cinchona alkaloids.

IPECACUANHA. Ipecacuanha. The dried root of Cephaëlis Ipecacuanha; growing chiefly in the Brazils, and sent from Rio Janeiro.

Description. Annulated or Brazilian ipecacuanha, as it is named to distinguish it from another kind (*striated* or Peruvian ipecacuanha, the produce of Psychotria emetica), is in the form of contorted pieces, from two to four inches in length, about the size of a small quill, knotted, having very deep circular fissures extending down to the whitish woody axis, and giving the appearance of a series of brownish or ash-coloured rings, strung on a white cord. The odour of ipecacuanha is slight, but disagreeable, more especially when powdered; the taste bitter, aromatic, and slightly acrid: it breaks easily, with a resinous or waxy fracture. The active ingredients reside in the cortex. The powder of ipecacuanha is pale brown.

Prop. & Comp. Ipecacuanha contains a feeble alkaloid, *emetine*, separable as a whitish or yellowish amorphous powder, of a bitter taste, soluble in alcohol, sparingly so in water and ether, and precipitated by tannin; also a peculiar acid, *cephaelic* or *ipecacuanic acid*, allied to catechin, formerly thought to be gallic acid, and striking green with the persalts of iron; gum, starch, and fatty or oily matter, are also present in the root. Water, spirit, and wine take up the active part, namely, the salt of emetine.

Off. Prep. **Pilula Ipecacuanhæ cum Scilla.** *Pill of Ipecacuanha with Squill.* (Compound powder of ipecacuanha, three ounces; squill and ammoniacum in powder, of each an ounce; treacle, a sufficiency.) One grain of opium is contained in twenty-three grains of the pill mass, nearly.

Pulvis Ipecacuanhæ Compositus. *Compound Powder of Ipecacuanha; Dover's Powder.* (Powdered ipecacuanha, half an ounce; powdered opium, half an ounce; powdered sulphate of potassium, four ounces.) One grain of opium and one of ipecacuanha are contained in ten grains of this powder.

Trochisci Ipecacuanhæ. *Ipecacuanha Lozenges.* (Ipecacuanha in powder, one hundred and eighty grains; refined sugar in powder, twenty-five ounces; gum acacia, an ounce; mucilage of gum acacia, two fluid ounces; water, a sufficiency. To make 720 lozenges. Each lozenge contains a quarter of a grain of ipecacuanha.)

Vinum Ipecacuanhæ. *Ipecacuanha Wine.* (Ipecacuanha, coarsely powdered, one ounce; acetic acid, one fluid ounce; distilled water, a sufficiency; sherry, twenty fluid ounces. Macerate the ipecacuanha in the acetic acid for twenty-four hours. Percolate with sufficient distilled water to produce one pint of liquor. Evaporate to dryness, powder the residue, and macerate in sherry for forty-eight hours and filter.)

Ipecacuanha is also contained in pilula conii composita, and in trochisci morphinæ et ipecacuanhæ.

Therapeutics. Ipecacuanha and emetine exert an irritant effect on mucous membranes and raw surfaces, when topically applied. Experiments on animals have shown that emetine, hypodermically injected, causes vomiting. It is said to do so more readily, and in smaller doses, when introduced into the stomach. It lowers the pulse, and relaxes muscular spasm induced by strychnine. After death from a poisonous dose of emetine, the lungs are found to be engorged.

Ipecacuanha in large medicinal doses is an emetic, not so speedy in its action as sulphate of zinc or mustard; somewhat depressing to the system, but less so than tartar emetic: in smaller doses, short of inducing either nausea or vomiting, it becomes absorbed and acts upon the different mucous membranes, especially those of the respiratory passages and of the alimentary canal, and is, therefore, expectorant, and sometimes laxative ; it also acts upon the skin as a diaphoretic. Ipecacuanha is well suited for an *emetic* in chest affections accompanied with fever, as in bronchitis, phthisis, and croup, in which the after-expectorant effect is of great service ; also to unload the stomach in dyspepsia when of an inflammatory character. As an *expectorant*, it is used in the various forms of bronchitic disease. *On account of its action on the alimentary canal*, it is of value in chronic dysentery and diarrhœa, for which diseases it was at one time held in great estimation. In the acute dysentery of the tropics, it is regarded as almost a specific. Large doses are given at intervals of 8--10 hours ; to prevent their being vomited, no liquids are allowed to be swallowed for some time after the dose, or the ipecacuanha is combined with a small proportion of opium. Ipecacuanha is often a useful adjunct to purgative medicines. As a *diaphoretic*, in the form of Dover's powder, it is frequently employed in catarrhal affections ; the combination with opium appears to increase its sudorific action.

Ipecacuanha has also been given in agues before the paroxysm, to prevent or cut it short ; and, on account of the *sedative* effect on the vascular system which follows the nausea, in hæmorrhages of various kinds.

Some individuals are pecularly susceptible to the influence of ipecacuanha, the effluvia from the powdered drug being sufficient to cause sneezing, cough, and a species of asthma.

Dose. Of ipecacuanha (powdered) as an *emetic*, 15 gr. to 30 gr. ; as an *expectorant*, &c., ½ gr. to 2 gr. ; of pill of ipecacuanha with squill, 5 gr. to 10 gr. ; of powder of ipecacuanha, 5 gr. to 15 gr., in acute dysentery, 20 gr. to 30 gr. ; of ipecacuanha wine, as an *emetic*, 3 fl. drm. to 6 fl. drm. ; as an *expectorant*, 5 min. to 40 min. The dose of compound ipecacuanha powder depends on the amount of opium desirable to administer rather than on the quantity of ipecacuanha.

Adulteration. Striated ipecacuanha above alluded to, and other roots, have occasionally been mixed with or substituted for ipecacuanha. Powdered ipecacuanha is sometimes largely adulterated with almond meal ; if moistened with water, and put aside in a warm place for half an hour, the admixture is detected by the odour of hydrocyanic acid which is given off.

CATECHU. Catechu. An extract from the leaves and young shoots of Uncaria gambier; prepared at Singapore, and in the islands of the Eastern Archipelago.

Synonym. Catechu Pallidum.

Description. It occurs in cubical pieces about an inch in diameter, porous in texture; externally of a reddish-brown colour, internally ochery yellow or pale brick red; of dull earthy fracture; taste bitter and astringent at first, then sweetish; no odour. The pieces are now less irregular in shape than formerly. There are many other trees which yield catechu, as the Acacia catechu, the source of the black catechu, not now official; also Areca catechu, or Betel-nut, &c. In fact, the extracts of the different parts of many plants possess properties not unlike those of the substance under consideration.

Prop. & Comp. Sp. gr. 1·39. The different varieties of catechu consist mainly of *catechu-tannic* (*mimotannic*) acid and *catechuic* acid or *catechin.* Catechu-tannic acid is soluble in cold water, and is distinguished from gallotannic acid by its yielding a greenish precipitate with persalts of iron; by not precipitating tartarated antimony; and by not yielding pyrogallic acid when heated; when exposed in a moist state it becomes dark red from the absorption of oxygen, and is rendered insoluble. Catechuic acid or catechin is nearly insoluble in cold water, but soluble in boiling water, alcohol, and ether; the solutions do not precipitate gelatine, and they strike green with persalts of iron: catechuic acid is converted by the action of alkalies and their carbonates into *Japonic* and *Rubinic* acids. It crystallises in colourless needles; its composition is represented by the formula $C_{20}H_{18}O_8$. Catechuic acid has the same relation to catechu-tannic acid that gallic acid has to tannic acid. Besides these substances, a yellow colouring matter, quercitin, mucilage, and insoluble compounds, are contained in catechu. Sir H. Davy found the following percentage of principles in pale and dark catechu. Catechin and mimotannic acid are included under the head of tannin.

	Tannin?	Extractive.	Mucilage.	Insoluble Matters.
Pale Catechu .	48·5	36·5	8·0	7·0
Dark Catechu .	54·5	34·0	6·5	5·0

The pale or official variety is entirely soluble in boiling water. The decoction when cool is not rendered blue by iodine.

Off. Prep. **Infusum Catechu.** *Infusion of Catechu.* (Powdered catechu, one hundred and sixty grains; cinnamon bark, bruised, thirty grains; boiling distilled water, ten fluid ounces.)

Pulvis Catechu Compositus. *Compound Powder of Catechu.* (Catechu, four ounces; kino, rhatany, of each two ounces; cinnamon bark and nutmeg, of each one ounce.)

Tinctura Catechu. *Tincture of Catechu.* (Powdered catechu, two ounces and a half; cinnamon bark, bruised, one ounce; proof spirit, one pint. By maceration and percolation.)

Trochisci Catechu. *Catechu Lozenges.* (Catechu, seven hundred and twenty grains; refined sugar, twenty-five ounces; gum acacia, an ounce, all in powder; mucilage of gum acacia, two fluid ounces; water, a sufficiency. Divide into 720 lozenges.) Each lozenge contains one grain of catechu.

Therapeutics. Catechu acts as a very powerful astringent, from the catechu-tannic acid and catechin contained in it. The catechin is astringent, but as it is very insoluble, its action is probably more local than that of the catechu-tannic acid, which probably is identical with that of ordinary tannic acid. (See Tannic and Gallic Acid.)

Catechu is used chiefly in affections of the alimentary canal, as in diarrhœa, and in some forms of atonic dyspepsia, accompanied with pyrosis; it may also be employed as a remote astringent in hæmorrhages and mucous discharges. Externally it may be used in the form of ointment, but has no advantage over the ointment of galls. It may be chewed, and the juice gradually swallowed in relaxed conditions of the uvula, palate, &c., and in some forms of hoarseness.

Dose. Of the powder, 10 gr. to 30 gr. or more; of infusion of catechu, 1 fl. oz. to 2 fl. oz.; of tincture of catechu, ½ fl. drm. to 2 fl. drm.; of compound catechu powder, 20 gr. to 40 gr.; of catechu lozenges, from one to six.

VALERIANACEÆ.

VALERIANÆ RHIZOMA. Valerian Rhizome. The rhizome and rootlets of Valeriana officinalis, dried; indigenous and cultivated. Collected in autumn from plants growing wild or cultivated in Britain.

Description. As met with, it consists of a short rhizome, with numerous radicles three or four inches long; of a dark yellowish-brown colour, a strong characteristic and disagreeable odour developed in the process of drying, and a bitter, acrid, camphoraceous and nauseous taste.

Prop. & Comp. Valerian root owes its activity to a *volatile oil* and *valerianic acid;* resinous, extractive, and gummy matters are also present. The volatile oil of valerian, sp. gr. 0·94, has a light greenish colour, and the colour of valerian; it consists of valerole, and a hydrocarbon, borneéne.

Valerole ($C_6H_{10}O$) is a crystalline body at a low temperature; it forms a blood-red solution with sulphuric acid, and when exposed to the air, gradually absorbs oxygen, acquires a peculiar strong odour, and is converted into valerianic acid.

Borneéne is a hydrocarbon identical with that found in Borneo camphor ($C_{10}H_{16}$).

Valerianic acid ($C_5H_{10}O_2$) can be procured in small quantities from valerian root by distillation with very dilute sulphuric acid; it is an oily liquid, sp. gr. 0·9, with the intense odour of valerian; it forms salts with the metallic bases, most of which are crystalline. This acid can also be formed, and much more economically, by the oxidation of Fousel oil or amylic alcohol.

Off. Prep.—Of Valerian. **Infusum Valerianæ.** *Infusion of Valerian.* (Valerian, bruised, a quarter of an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Valerianæ. *Tincture of Valerian.* (Valerian, in fine powder, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Tinctura Valerianæ Ammoniata. *Ammoniated Tincture of Valerian.* (Valerian, in fine powder, two ounces and a half; aromatic spirit of ammonia, twenty fluid ounces. Prepared by maceration.)

Therapeutics. Valerian acts as a powerful stimulant and antispasmodic, and is peculiarly adapted for the treatment of the various symptoms occurring in hysterical subjects, as spasm, hemicrania, globus, palpitation, &c.; it has also been found useful in some cases of chorea, epilepsy, hypochondriasis, and, as an adjunct to tonics, in intermittents. The volatile oil is probably the chief active ingredient of the drug. Some physicians have even doubted the value of the valerianic acid, but it can hardly be conceived that such a powerfully smelling body as the acid is devoid of antispasmodic properties. Although valerian doubtless possesses anti-spasmodic powers, they are very inferior to those of asafœtida.

Dose. Of valerian, in powder, 10 gr. to 30 gr.; of infusion of valerian, 1 fl. oz. to 2 fl. oz.; of tincture of valerian, 1 fl. drm. to 2 fl. drm.; of ammoniated tincture of valerian, ½ fl. drm. to 1 fl. drm.

SODII VALERIANAS. Valerianate of Sodium. $NaC_5H_9O_2$.

Prep. Prepared by distilling amylic alcohol with a mixture of sulphuric acid and bichromate of potassium, and saturating the distilled fluid with soda. In this process amylic alcohol, $C_5H_{12}O$, undergoes oxidation by the chromic acid which is set free when the sulphuric acid is mixed with bichromate of potassium, and is converted into valerianic acid, which distils over. This acid bears the same relation to amylic alcohol as acetic acid does to ethylic alcohol, or formic acid to wood spirit or methylic alcohol. The fluid containing the valerianate of sodium is evaporated to dryness and the valerianate is fused and allowed to cool.

Prop. It is presented in dry white masses, not alkaline in reaction, entirely soluble in rectified spirit, evolving an odour of valerian when dilute sulphuric acid is added.

Therapeutics. Valerianate of sodium seems to resemble valerian in its action, and may be used in cases where the administration of valerian is desirable. It is introduced into the British Pharmacopœia for manufacturing the valerianate of zinc.

Dose. ½ gr. to 5 gr.

ZINCI VALERIANAS. Valerianate of Zinc. $Zn(C_5H_9O_2)_2$.

Prep. Prepared by mixing a solution of sulphate of zinc and valerianate of sodium, and separating and purifying the crystals which are formed. It may also be prepared by saturating valerianic acid with carbonate of zinc.

Prop. This salt occurs in white pearly crystalline scales, with an odour of valerianic acid and a metallic taste; soluble in alcohol and hot water; sparingly so in cold water and ether. Heated to redness in an open crucible it leaves a residue of oxide of zinc, soluble in dilute sulphuric acid, and the solution is precipitated white by sulphydrate of ammonium. This salt has been frequently adulterated, especially with sulphate of zinc; to show the absence of this latter salt, the solution of valerianate of zinc in hot water should give no precipitate with chloride of barium. When valerianate of zinc is distilled with dilute sulphuric acid, the distillate (valerianic acid) when mixed with a solution of acetate of copper, should not immediately affect the transparency of the fluid, but form after a little time oily drops, passing gradually into a bluish-white crystalline deposit: this shows the absence of butyric acid (the butyrate of zinc being a common adulteration of the salt as found in commerce).

Therapeutics. Valerianate of zinc is a nervine tonic and antispasmodic, and has been given with advantage in cases where the combined action of the metal and valerian seems desirable, as in hysteria, chorea, epilepsy, and various neuralgic affections, especially headache; it is said also to act as an anthelmintic.

Dose. 1 gr. to 3 gr.; the dose may be increased till some nausea is produced.

VALERIANATE OF QUININE (not official) forms white silky needles, with a strong odour and taste; soluble in alcohol, and sparingly so in water, especially when cold; it is decomposed by heat with the escape of valerianic acid.

Therapeutics. It is sometimes employed in medicine; it is said to be particularly useful in some forms of intermittent and spasmodic neuralgic affections.

Dose. 1 gr. to 5 gr.

VALERIANATE OF IRON and **VALERIANATE OF AMMONIUM** have also been used in medicine, and may be given in the same doses as the corresponding salt of zinc.

COMPOSITÆ.

PYRETHRI RADIX. Pellitory Root. The dried root of Anacyclus Pyrethrum, or Pellitory of Spain; growing in Barbary, Spain, and imported from the Levant.

Description. A fusiform root, cut into cylindrical pieces two to four inches long, and about the thickness of the little finger, with a thick brown bark, studded by dark coloured receptacles of resin; breaking with a resinous fracture, and exhibiting a radiated structure, dark brown in colour, studded with black shining points.

Prop. & Comp. It contains at least two *resins*, one of which has been named *pyrethric* acid, or pyrethrin; an *acrid oil*, and tannin.

Off. Prep. **Tinctura Pyrethri.** *Tincture of Pellitory.* (Pellitory, in fine powder, four ounces; rectified spirit, one pint; by maceration and subsequent percolation.)

Therapeutics. A topical irritant, causing pricking in the mouth, and flow of saliva and buccal mucus; it is used as a masticatory in paralysis of parts about the mouth, also as a local stimulant in neuralgia in the teeth, also in relaxed conditions of the throat, and in aphonia. The tincture may be diluted with water and used as a gargle. Pellitory is not given internally.

SANTONICA. Santonica. The unexpanded flower-heads or capitula of Artemisia maritima, var. Stechmanniana (Artemisia pauciflora). Imported from Russia.

SANTONINUM. Santonin. A crystalline neutral principle obtained from Santonica. $C_{15}H_{18}O_3$.

Description. The flower-heads, which resemble seeds in appearance, are nearly half a line in breadth, and one-tenth of an inch long, fusiform, blunt at the ends, greenish-brown in colour, smooth, not hairy, formed of imbricated involucral scales with a green mid-rib, enclosing four or five tubular florets; strong odour, bitter camphoraceous taste.

Prep. Santonin is prepared by boiling bruised santonica for some time with water and lime, straining and reducing the bulk of the solution by evaporation. To this, while still hot, hydrochloric acid is added, until the liquid becomes slightly and permanently acid, and it is then set aside for the precipitate of santonin which forms to subside. The oily matter floating on the surface is removed by skimming, and the fluid decanted off from the precipitate, which is collected on filtering paper, washed first with cold distilled water, then with solution of ammonia, and again with water, till the washings are colourless. The precipitate is then dried at a gentle heat; purified by re-dissolving in boiling spirit with a little animal charcoal, filtering, and setting the liquid aside in a dark place to allow crystals of santonin to deposit. The crystals should be dried on filtering paper in the dark, and preserved in a bottle protected from the light.

Prop. Santonica contains traces of volatile oil and a crystallisable substance, *santonin* ($C_{15}H_{18}O_3$), which occurs in brilliant, white, four-sided, flat prisms, tasteless or feebly bitter, odourless; scarcely soluble in cold water, sparingly in boiling water, but abundantly in chloroform, and boiling rectified spirit; soluble also in ether; not dissolved by dilute mineral acids; the crystals become yellow by exposure to light. Santonin is neutral or feebly acid. It dissolves in solutions of the caustic fixed alkalies, forming definite compounds called santonates. Added to a warm alcoholic solution of potash it yields a violet-red colour. Santonate of sodium is more soluble than santonin, and has been employed in its stead. Prolonged boiling in dilute nitric acid converts santonin into succinic acid. When heated to 277° F. (136°·2 C.) it melts to a colourless liquid, which solidifies to a crystalline mass on cooling, but by prolonged fusion it becomes amorphous, following in this the analogy of other crystalline resins.

Off. Prep. **Trochisci Santonini.** *Santonin Lozenges.* (Santonin, seven hundred and twenty grains; refined sugar in powder, twenty-five ounces; gum acacia in powder, one ounce; mucilage of gum acacia, two fluid ounces; distilled water, a sufficiency. To make 720 lozenges, each containing one grain of santonin.)

Therapeutics. Administered internally, santonin causes xanthopsy or yellow vision, sometimes preceded by an exaggerated sensitiveness to the violet rays of the spectrum. This effect may last for several hours. It is not due to coloration of the ocular media, but to some specific influence either upon the retina or the visual centre in the brain. The sensibility of the retina for violet rays appears to be first stimulated, then blunted. Again santonin, even in a three-grain dose, stains the urine of a yellow colour: this effect may continue for two or three days, and is sometimes attended by irritation of the bladder. In large doses, the drug has been known to cause giddiness, headache, vomiting, convulsions, and even death.

It is employed as an anthelmintic. Its small bulk and comparative tastelessness render it very suitable for children. It kills the round-worm (Ascaris lumbricoides), but it is useless against the tape-worm or the thread-worm (Oxyuris vermicularis), though it is often given with a view to the destruction of the latter parasite. It should be followed by a mild purgative.

Dose. Of santonica or worm seed, from 10 gr. to 60 gr. Seldom used in this form. The dose of santonin is from 1 gr. to 3 gr. for a child; 2 gr. to 6 gr. or more for an adult, given in the form of powder, or in castor oil. It should be given at night to allow the xanthopsy time to pass off without discomfort. Of the lozenges, one to six.

ANTHEMIDIS FLORES. Chamomile Flowers. The Flower of Anthemis nobilis, or Common Chamomile; indigenous and cultivated.

OLEUM ANTHEMIDIS. Oil of Chamomile. The oil distilled in Britain from chamomile flowers.

Description. The *flowers* may be either single or double, consisting of a yellow convex disk and white rays. The florets of the ray are numerous, white, ligulate, and three-toothed; those of the disk, yellow; by cultivation many of the latter are converted into white ray florets, and the flower is then said to be double. Both varieties, but especially the single, have a strong aromatic odour and very bitter taste.

Prop. & Comp. The flowers contain a *volatile oil*, and a bitter *extractive matter*. The oil is of a pale blue or greenish blue colour, becoming yellowish by age; it has the peculiar odour and aromatic taste of the flowers; sp. gr. 0·91; it probably is a mixture of a hydrocarbon ($C_{10}H_{16}$), the real volatile oil, with an oxidised substance (angelic aldehyde), which when treated with potash is converted into angelate of potash ($C_5H_7KO_2$).

Off. Prep.—Of the Flowers. **Infusum Anthemidis.** *Infusion of Chamomile.* (Chamomile flowers, half an ounce; boiling distilled water, ten fluid ounces.)

Of the Flowers and Oil.

Extractum Anthemidis. *Extract of Chamomile.* (A decoction of the flowers evaporated until it is of a suitable consistence for making pills, and with a subsequent addition of fifteen minims of the oil for each pound of flowers employed.)

Therapeutics. Chamomile is an aromatic stomachic and tonic; in large doses, especially in the form of a warm infusion, it acts as an emetic; it is used in atonic dyspepsia, also to assist the action of emetics. It is thought to be an anti-periodic. The oil is stimulant and carminative, a valuable addition to purgatives.

Dose. Of the infusion, 1 fl. oz. to 4 fl. oz.; of the oil, 1 min. to 4 min.; of the extract, 2 gr. to 10 gr. The extract forms a useful adjunct to stomachic and other pills.

TARAXACI RADIX. Dandelion Root. The fresh and dried root of Taraxacum Officinale (Taraxacum Dens-leonis), Common Dandelion; indigenous; gathered in the autumn.

Description. The root is tapering and branched, frequently a foot or more in length; it yields a bitter milky juice when cut, which becomes brown by exposure ; smooth and dark when fresh, when dried it is more or less shrivelled ; of a brown colour externally ; it breaks with a short fracture, and shows a yellow porous central axis, with a variable number of concentric rings, surrounded by a thick whitish bark, of a sweetish bitter taste.

Prop. & Comp. The juice contains resinous matters, sugar, gum, and a *bitter extractive,* from which a crystalline principle named *taraxacin* has been obtained, bitter in taste ; soluble in alcohol, ether, and hot water, sparingly so in cold. *Mannite* has been also extracted, but whether it is a product of the fermentation of the juice or exists in the root is as yet undecided.

Off. Prep.—Of the Dried Root.

Decoctum Taraxaci. *Decoction of Taraxacum.* (Dandelion root, one ounce ; distilled water, twenty fluid ounces.)

Extractum Taraxaci Liquidum. *Liquid Extract of Dandelion.* (Dandelion root, forty ounces ; proof spirit, four pints ; distilled water, a sufficiency. Prepared by maceration with spirit, evaporation, and subsequent addition of distilled water to make up the volume to forty fluid ounces.)

Of the Fresh Root.

Extractum Taraxaci. *Extract of Taraxacum.* (Prepared as the other extracts, from the expressed juice of the fresh root.)

Succus Taraxaci. *Juice of Taraxacum.* (The juice expressed from the dandelion root, to every three measures of which one measure of rectified spirit is added.)

Therapeutics. The value of taraxacum as a remedy is a matter which admits of some doubt. It is supposed to have a specific action on the liver, modifying and increasing its secretion ; hence its widely spread use in hepatic diseases, more particularly when attended with an habitually engorged state of the vessels of that organ. Given for some time, it is thought to act as an alterative to the system. In dropsies from hepatic obstruction, it is generally administered in combination with a purgative. Many patients assert positively that when taking dandelion their digestion is made more perfect, and it is not uncommon to find dyspeptics resort to its use of their own accord ; but it is difficult by ordinary clinical observation to make out the powers of the remedy. In some patients a well-marked diuretic action is observed.

Dose. Of decoction of taraxacum, 2 fl. oz. to 4 fl. oz. ; of liquid extract of taraxacum, ½ fl. drm. to 2 fl. drm. ; of extract of taraxacum, 5 gr. to 30 gr. or more ; of juice of taraxacum, 1 fl. drm. to 2 fl. drm. or more.

LACTUCA. The flowering plant of Lactuca virosa, the Wild Lettuce; indigenous.

Description. The lettuce is too familiar to need description. *Lactucarium* is the name given to a substance which is prepared by pressing out the milky juice of the flowering herbs and afterwards inspissating with a gentle heat; it occurs in small masses or lumps of a brown colour, with an odour very similar to opium, and a bitter taste.

Prop. & Comp. The only peculiar substances contained in the lettuce are those found in lactucarium. Lactucarium yields to alcohol a bitter extractive matter; it is also sparingly soluble in water. A crystalline substance, *lactucone*, soluble in alcohol and ether, but not in water, has been extracted from lactucarium, forming 42 per cent. of the fresh drug; and two other substances, *lactucic acid* and *lactucine*, soluble in water, the latter being crystalline and resembling *mannite.*

Off. Prep. **Extractum Lactucæ.** (Prepared as other green extracts from the expressed juice.)

Therapeutics. The lettuce has been asserted to possess some narcotic power, and has been occasionally eaten at bed-time as a narcotic; extract of the fresh juice and lactucarium are employed, and have been prescribed, in cases in which opium disagrees, to procure sleep, allay cough, &c. Lettuce has certainly very feeble powers, and the author has given thirty grains and more of good lactucarium, and repeated the dose every four hours, without noticing any decided narcotic effect from its administration.

Dose. Of lactucarium, or extract of lettuce, 5 gr. to 15 gr.

ARNICÆ RHIZOMA. Arnica Rhizome. The dried rhizome and rootlets of Arnica montana; found in the mountainous parts of Europe.

Description. The rhizome is from one to three inches long, and one-sixth to a quarter of an inch thick, cylindrical, contorted, rough from the scars of fallen leaves, and furnished with numerous long slender fibres. The flowers of arnica are of a dark yellow colour, calyx green; the ray florets ligulate, much longer than the calyx; the florets of the disk tubular.

Prop & Comp. The flowers, leaves, and rhizome of this plant, all of which are often employed, have a peculiar odour when fresh, and are apt to excite sneezing. The active properties are taken up by water. In addition to the other constituents of plants, arnica contains a *volatile oil* and a bitter principle identical with *cytisin*; a *volatile alkaloid*, resembling lobelina, has also been procured from it, and an acrid *resin*, soluble in alcohol.

Off. Prep. **Tinctura Arnicæ.** *Tincture of Arnica.* (Arnica rhizome, in fine powder, one ounce; rectified spirit, one pint. Prepared by maceration and percolation.)

Therapeutics. Given internally, arnica acts as a stimulant and irritant: it has been supposed to influence the spinal cord; its action upon the system has not however been satisfactorily made out, but it is said to be useful in some forms of nervous headache, also in chronic rheumatic pains. It is chiefly employed as an external application for the dispersion of tumours, and for sprains and bruises. The author has reasons for questioning the virtues of arnica as a remedy in these cases, and his grounds for so doing are the following:

Bruises, made by means of cupping glasses, were thus dealt with: some were treated with spirit and water; some with tincture of arnica of the same alcoholic strength; and others were left to themselves.

It was found that bruises treated with spirit became much more rapidly well than those left to themselves; but it was also found that the alcoholic solution of arnica had no more power in expediting the return of the skin to its normal condition than spirit of the same strength. The same relative results were arrived at when the injuries produced by the cupping glasses were treated before ecchymosis occurred; spirit and tincture of arnica appeared to be equal in their power of preventing the development of the bruises. These results were brought before the College of Physicians in 1864.

Dose. Internally, the tincture may be given in doses of from 30 min. to 1 fl. drm. or more; externally, the tincture is employed either alone or diluted with water; it is sometimes added to liniments.

LOBELIACEÆ.

LOBELIA. Lobelia. The dried flowering herb of Lobelia inflata, Indian Tobacco; indigenous in the United States.

Description. The whole herb is official; stem angular; leaves alternate, ovate, toothed, somewhat hairy beneath; capsule ovoid, inflated, ten-ribbed; herb acrid. It is generally found in oblong, compressed cakes, weighing from half a pound to a pound each.

Prop. & Comp. It is somewhat irritating to the nose, and causes a burning taste, observed a short time after the substance has been chewed. Besides colouring matters and the common constituents of plants, it contains a volatile oil or peculiar acid, the *lobelic acid*, and an alkaline principle, *lobelina*. This substance is a yellowish liquid, lighter than water, very soluble in ether and alcohol, and forms crystalline salts with the mineral acids; it is probably the active agent of the plant.

Off. Prep. **Tinctura Lobeliæ.** *Tincture of Lobelia.* (Lobelia, in fine powder, two ounces and a half; proof spirit, one pint. Prepared by maceration and percolation.)

Tinctura Lobeliæ Ætherea. *Ethereal Tincture of Lobelia.* (Lobelia in coarse powder, two ounces and a half; spirit of ether, one pint. Prepared by maceration.)

Therapeutics. In small doses it is expectorant and diaphoretic; in larger, emetic or cathartic. In too large quantities it produces much depression, nausea, cold sweats, and even death, preceded by convulsions; it closely resembles tobacco in its action. It has been much lauded in attacks of spasmodic asthma, and also in other affections of the air-passages, attended with dyspnœa. In some cases it forms a useful adjunct to diuretics.

Dose. Of the alcoholic tincture or ethereal tincture, 10 min. to ½ fl. drm. or more, carefully watching any symptom of vascular depression.

ERICACEÆ.

UVÆ URSI FOLIA. Bearberry Leaves. The leaf of Arctostaphylos Uva Ursi, Whortleberry, Bearberry, or Trailing Arbutus; growing in the northern parts of Europe and America.

Description. The leaves are very shortly stalked, dark green, obovate, obtuse, entire, shining on the upper surface, reticulated underneath, coriaceous in consistence, about three-fourths of an inch in length. Not dotted beneath nor toothed on the margin.

Prop. & Comp. Odour faintly tea-like when powdered; taste astringent; the infusion giving a bluish black precipitate with perchloride of iron. Contains *tannin* about 35 per cent., with a trace of gallic acid, one or two crystallisable principles, bitter extractive, &c.

Off. Prep. **Infusum Uvæ Ursi.** *Infusion of Bearberry.* (Bearberry leaves, half an ounce; boiling distilled water, ten fluid ounces.)

Therapeutics. An astringent and diuretic, used in vesical and urethral affections, as chronic catarrh of the bladder, to diminish irritability and mucous discharge; also in gleets; sometimes employed in kidney affections; it may be given with alkalies or acids.

Dose. Of powder, 10 gr. to 30 gr.; of the infusion, 1 fl. oz. to 2 fl. oz.

Adulteration. Leaves of *Red Whortleberry* or *Vaccinium Vitis Idœa* may be added, distinguished by being dotted and not reticulated on the under surface: also common *box* leaves, which can be recognised by their want of astringency.

SAPOTACEÆ.

GUTTA PERCHA. Gutta Percha. The concrete juice of Dichopsis Gutta (Isonandra gutta), the Gutta Percha or Taban tree, growing in Borneo, Sumatra, and the other Islands of the Eastern Archipelago. It is also derived from several other trees of the same natural order.

Description. In tough, flexible pieces of a light-brown or chocolate colour.

Prop. & Comp. Almost wholly soluble in chloroform, the solution being more or less turbid. Also in carbon disulphide, oil of turpentine, and benzol. Insoluble in water, alcohol, alkaline solutions or dilute acids. At a temperature below 212° F. (100° C.), gutta percha becomes so soft that it may be moulded like wax, or welded together: on cooling, it retains the form which has been impressed upon it. It is an insulator of electricity, and is hence largely employed for coating telegraph wires, &c. Commercial gutta percha consists of three distinct portions: *pure gutta*, a milk-white solid, having the formula $C_{20}H_{32}$; this forms about 80 per cent. of the whole; a crystalline resin, $C_{20}H_{32}O_2$; and an amorphous resin, $C_{20}H_{32}O$. Pure gutta percha slowly absorbs oxygen when exposed to air and light, and is gradually converted into a brittle resin, wholly devoid of plasticity.

Off. Prep. **Liquor Gutta Percha.** *Solution of Gutta Percha.* (One ounce of gutta percha, in thin slices, is dissolved by agitation in six fluid ounces of chloroform. One ounce of finely powdered carbonate of lead, mixed with two fluid ounces of chloroform, is then added, and the whole is shaken up. The solution is set aside to allow any insoluble matter to subside, and the clear liquid decanted and kept in a stoppered bottle.) Employed in the preparation of Charta Sinapis.

Use. Chiefly employed on account of its physical properties, for making splints, or gutta percha tissue, and similar articles used to prevent the evaporation of lotions, also to cover poultices and fomentations, &c.

STYRACACEÆ.

BENZOINUM. Benzoin. A balsamic resin (indurated in the air) flowing from the incised bark of Styrax Benzoin or Benjamin tree; growing in Sumatra, Siam, Borneo, and other islands of the Eastern Archipelago. (*See* also STYRAX PRÆPARATUS.)

ACIDUM BENZOICUM. Benzoic Acid. $\mathbf{HC_7H_5O_2}$. An acid prepared from benzoin by sublimation. Not chemically pure.

Description. Benzoin occurs either in the form of reddish-white tears, separate or slightly adherent, or more frequently in masses consisting of the tears completely agglutinated with a brownish-red substance; on fracture some specimens present an almond-like appearance, the tears being an inch or more in length and milk white; in others the white substance is very small in amount, and the masses when broken resemble reddish-brown granite; this is called *Siam* benzoin. Benzoin has little taste, but an agreeable odour resembling vanilla. An inferior darker kind, called *Calcutta* benzoin, is sometimes met with.

Prop. & Comp. Benzoin contains from 10 to 20 per cent. of *benzoic acid;* the remainder consists of a resin, partly soluble in ether. Benzoin is soluble in rectified spirit and liquor potassæ; and gives off fumes of benzoic acid when heated. *Benzoic acid* when pure forms soft, feathery, flexible, white crystals, with a pearly lustre; generally impregnated with empyreumatic oil, which gives it a strong odour, resembling that of benzoin; slightly soluble in water, but readily so in rectified spirit; it is dissolved also by solutions of ammonia, potash, soda, and lime, from which it is precipitated by hydrochloric acid, unless the solution be very dilute. It melts at 248° F. (120° C.), and boils at 462° F. (238°·9 C.). When heated to the last-named temperature it should sublime, leaving only a slight residue.

Off. Prep. **Tinctura Benzoini Composita.** *Compound Tincture oj Benzoin.* (Benzoin, coarsely powdered, two ounces ; prepared storax, one ounce and a half ; balsam of tolu, half an ounce ; Socotrine aloes, one hundred and sixty grains ; rectified spirit, one pint. Prepared by maceration.)

Benzoin is also contained in benzoated lard and in spermaceti ointment.

Benzoic Acid is prepared by subliming benzoin in an iron vessel, and collecting the sublimed acid by means of a cylinder of stiff paper inverted over the vessel.

Trochisci Acidi Benzoici. *Benzoic Acid Lozenges.* (Benzoic acid, three hundred and sixty grains ; refined sugar, in powder, twenty-five grains ; gum acacia, in powder, one ounce ; mucilage of gum acacia, two fluid ounces ; distilled water, a sufficiency. Divided into 720 lozenges, each of which contains half a grain of benzoic acid.)

Benzoic acid is contained in compound tincture of camphor, benzoate of ammonium, and ammoniated tincture of opium.

Therapeutics. *Benzoin* is a stimulant expectorant, formerly used in chronic bronchitic affections ; externally in the form of the tincture (FRIAR'S BALSAM) it is applied as a stimulant to ulcers and wounds. *Benzoic acid*, when taken internally, is converted into and appears in the urine as hippuric acid, rendering this fluid more acid, but not diminishing the amount of uric acid, although the administration of the benzoates will greatly prevent the crystallisation of uric acid in the urine. Benzoic acid also acts as a diuretic.

Benzoic acid is used when we wish to stimulate the mucous membrane of the bladder and produce an alterative effect in cases of chronic inflammation of that organ, especially when accompanied with alkaline urine ; it has much power in correcting the fetor of the urine which accompanies cases of irritable bladder from enlarged prostate, &c.

Dose. Of benzoin, 10 gr. to 30 gr. ; of the compound tincture, ½ fl. drm. to 1 fl. drm., suspended in water by means of mucilage or yolk of egg ; of benzoic acid, 10 gr. to 15 gr.

AMMONII BENZOAS. Benzoate of Ammonium. $NH_4C_7H_5O_2$.

Prep. (Solution of ammonia, three fluid ounces ; benzoic acid, two ounces ; distilled water, four fluid ounces : dissolve and set aside to crystallise.)

Prop. In colourless laminar crystals, which are readily soluble in water, in this respect differing from benzoic acid; soluble also in alcohol. The watery solution, when acidulated with hydrochloric acid, deposits benzoic acid; heated with caustic potash it evolves ammonia. It is entirely sublimed by heat. The aqueous solution gives a bulky yellow precipitate with persalts of iron.

Therapeutics. Benzoate of ammonium acts as a diuretic and slight stimulant; it is employed in cases of chronic inflammation of the bladder, where there is a tendency to phosphatic deposits. On account of its ready solubility it is much more easily administered than benzoic acid, which it resembles in its action. It appears in the urine as hippuric acid. (*See* Benzoic Acid.)

Dose. 10 gr. to 20 gr.

OLEACEÆ.

OLEUM OLIVÆ. Olive Oil. An oil expressed from the ripe fruit of Olea Europæa, the European Olive; growing near the shores of the Mediterranean.

SAPO DURUS. Hard Soap. (*Synonym.* White Castile Soap.) Soap made of olive oil and soda.

SAPO MOLLIS. Soft Soap. Made of olive oil and potash.

SAPO ANIMALIS. Curd Soap. Made of soda and a purified animal fat consisting chiefly of stearin.

Descrip., Prop. & Comp. The olive fruit, used at dessert, is a smooth, elliptical, single-seeded drupe, about $\frac{3}{4}$ inch long, and $\frac{1}{2}$ inch in diameter, of a dark green colour. The oil, *Oleum Olivæ*, called also Salad Oil, is of a pale straw colour, with a slight agreeable odour and taste; sp. gr. 0·92; congeals partially at about 36° F. (2°·2 C.); and consists of about 72 per cent. of *Olein*, and 28 per cent. of *Palmitin*; it unites with alkalies and other bases, forming soaps; the two alkaline soaps are named Sapo durus and Sapo mollis.

Sapo durus, or the combination of the oil with soda, called also hard soap, is greyish-white, horny and pulverisable when kept in warm dry air, easily moulded when heated. It is often marbled blue or red when of the Castile variety, from the presence of a little oxide of iron. Hard soap is soluble in rectified spirit and in water; the latter solution is precipitated by calcium, lead, and some other metallic salts; it is composed of *oleate* and *palmitate* of sodium. Does not give a greasy stain to paper. Incinerated it leaves an ash which does not deliquesce.

Sapo mollis, the combination of the oil with potash, forms a yellow, transparent, very soft substance, inodorous, of gelatinous consistence ; it is usually spotted with white points, from some crystallisation having taken place ; in other respects it agrees with soda soap ; it is a compound of *oleate* and *palmitate* of potassium. Soft soap should be entirely soluble in rectified spirit, and should not impart an oily stain to paper. Incinerated it leaves an ash which is very deliquescent.

Sapo animalis, or curd soap, is introduced here for the sake of convenience, as it is not made with olive oil. It is white, or of a very light grey hue ; dry ; nearly inodorous ; horny and pulverisable when kept in a dry, warm place. Soluble in rectified spirit, and hot water ; the solution is almost neutral to test-paper. Does not give a greasy stain to paper. May be easily moulded when heated.

Off. Prep.—Of Olive Oil.

Olive oil is used in the preparation of the liniments of ammonia, lime, and camphor, of many plasters, of several ointments, of the enema of sulphate of magnesium, and of blistering paper.

Of Hard Soap.

Linimentum Saponis. *Liniment of Soap.* (Hard soap, two ounces ; camphor, one ounce ; oil of rosemary, three fluid drachms ; rectified spirit, sixteen fluid ounces ; distilled water, four fluid ounces.) This liniment is commonly known by the name of Opodeldoc.

Pilula Saponis Composita. *Compound Pill of Soap.*
Synonym. Pilula Opii.
(Opium, half an ounce ; hard soap, two ounces ; glycerine, a sufficiency.) One part of opium is contained in nearly six parts of the pill.
Hard soap is also used in the preparation of many other pills.

Of Soft Soap.

Employed in the preparation of liniment of turpentine.

Of Curd Soap.

Emplastrum Saponis. *Soap Plaster.* (Curd soap, six ounces ; lead plaster, two pounds and a quarter ; resin, one ounce.)

Emplastrum Saponis Fuscum. *Brown Soap Plaster.* (Curd soap, ten ounces ; yellow wax, twelve ounces and a half ; olive oil, one pint ; oxide of lead, fifteen ounces ; vinegar, one gallon.)
Curd soap is also contained in resin plaster, in compound extract of colocynth, in the liniment of iodide of potassium and soap, in phosphorus pill, and in compound scammony pill, and in the suppositories (with soap) of morphine, carbolic acid, and tannic acid.

Therapeutics. Olive Oil is used in medicine internally as a demulcent in the form of emulsion ; it may also be used as an enema : if taken in large doses it is slightly laxative, as is the case with almost all fixed oils : externally it is much employed in the form of liniment as a lubricating substance.

Soap acts as an antacid, but is apt to disagree with the stomach from the liberation of the fatty acids contained in it, especially, as often happens, when not made of olive oil ; it possesses no particular value as an internal remedy, and is more used as an adjunct to other drugs and to aid in the formation of pills, than for its medicinal virtue. Soap is used as an external application, and is more valued for its mechanical effect than for any special property it possesses.

Dose. Of olive oil, 1 fl. drm. to 1 fl. oz. or more, as a demulcent or laxative ; of hard soap or soft soap, as an antacid, &c., 5 gr. to 20 gr. ; of compound soap pill, 3 gr. to 5 gr.

Adulteration. Soap made from animal oils or fats and potash is very commonly employed in place of the official soft soap, and common hard soap is substituted for the greyish-white Castile variety.

ACIDUM OLEICUM. Oleic Acid. A fluid fatty acid, $HC_{18}H_{33}O_2$, usually not quite pure.

Prep. Oleic acid is obtained by the saponification of olein, or by the action of superheated steam on fats, with subsequent separation from solid fats by pressure.

Prop. Oleic acid is an oily liquid of a pale sherry colour, odourless and tasteless, or with a faint peculiar odour and taste, free from acridity. The crude darker acid, obtained by the action of superheated steam on olive oil, is purified by washing with sulphurous acid, with water, and by subsequent filtration. It is freely soluble in alcohol, ether, chloroform, benzol, and fixed oils ; insoluble in water.

When exposed to air it becomes brown and decidedly acid. Sp. gr. 0·860 to 0·890. At 40° to 41° F. (4°·5 to 5° C.) it becomes semi-solid, melting again at 56° to 60° F. (13°·3 to 15°·5 C.). It should be completely saponified when warmed with carbonate of potassium ; if the resulting soap is dissolved in water, neutralised with acetic acid, and treated with acetate of lead it should yield a precipitate, which after washing with boiling water, is almost entirely soluble in ether. This test proves the absence of more than traces of palmitic and stearic acids.

Uses. Oleic acid is a useful solvent for alkaloids, and combines with most metallic oxides, forming oleates of the metals. It is thinner than the ordinary fixed oils, hence it can be applied to the skin with greater facility; when thus employed it is rapidly absorbed, leaving the surface clean and free from greasiness. It is only introduced into the Pharmacopœia for the preparation of oleates.

Non-official oleates of *alkaloids* are best prepared by direct solution in oleic acid at the ordinary temperature, the solvent action being aided by trituration.

OLEATUM HYDRARGYRI. Oleate of Mercury.

Prep. By gradually adding an ounce of yellow oxide of mercury to nine ounces of oleic acid with constant stirring and occasional trituration until it is all dissolved. It may be prepared with half the above mentioned proportion of oleic acid, the remainder being added when the oleate is dispensed.

Prop. A light-brown, oleaginous, semi-solid substance composed of oleate of mercury and oleic acid, and having the slight peculiar odour of oleic acid. When heated with copper foil a film of mercury is deposited upon the metal.

Therapeutics. The oleate of mercury forms a convenient substitute for various mercurial ointments, the oleic acid favouring rapid absorption.

OLEATUM ZINCI. Oleate of Zinc.

Prep. Prepared by stirring one ounce of oxide of zinc with nine ounces of oleic acid, allowing the mixture to stand for two hours, and then heating on a water-bath until the oxide is dissolved.

Prop. Oleate of zinc is a dry soapy granular powder.

Off. Prep. **Unguentum Zinci Oleati.** *Ointment of Oleate of Zinc.* (Oleate of zinc, one ounce; soft paraffin, one ounce.)

Therapeutics. This compound is not susceptible of easy absorption; it is of use as a drying surface powder for eczema or hyperidrosis. The ointment may be employed for a similar purpose.

GLYCERINUM. Glycerine. A sweet principle, $C_3H_5(HO)_3$, obtained from fats and fixed oils, and containing a small percentage of water.

Prop. & Comp. *Glycerine* separates from the olein, palmitin, or stearin, contained in all ordinary fats and fixed oils, when they are saponified or distilled with superheated steam; it is a clear colourless syrupy-looking liquid, sp. gr. 1·250, very sweet, oily to the touch, freely soluble in water and alcohol; the watery solution does not ferment with yeast, nor does glycerine itself evaporate or dry at an ordinary temperature. Its composition is represented by the formula $\mathbf{C_3H_5(HO)_3}$; it is a triatomic alcohol, which forms fats and oils by the replacement of three of its atoms of hydrogen by the radicals of the fatty acids. When decomposed by heat it evolves intensely irritating vapours of acrolein. Its solution is not affected by nitrate of silver, sulphydrate of ammonium, oxalate of ammonium, nor chloride of barium, nor does it alter the colour of moistened blue or red litmus paper, showing the absence of chlorides, metallic impurities, calcium, sulphates, free acids and alkalies. Shaken with an equal volume of sulphuric acid, no coloration, or only a very slight straw coloration, should result. When gently heated with dilute sulphuric acid, no rancid odour is produced. Glycerine possesses very remarkable solvent powers: arsenious acid, carbolic acid, borax, many vegetable alkaloids and acids dissolve freely in it. Heated with starch, it forms a "plasma" (Glycerinum Amyli), which can be employed as an ointment.

Off. Prep. **Glycerinum Acidi Carbolici.** *Glycerine of Carbolic Acid.* (Carbolic acid, an ounce; glycerine, four fluid ounces. Rub together until the acid is dissolved.)

Glycerinum Acidi Gallici. *Glycerine of Gallic Acid.* (Gallic acid, an ounce; glycerine, four fluid ounces.)

Glycerinum Acidi Tannici. *Glycerine of Tannic Acid.* (Tannic acid, an ounce; glycerine, four fluid ounces.)

Glycerinum Aluminis. *Glycerine of Alum.* (Alum, one ounce; glycerine, five fluid ounces.)

Glycerinum Boracis. *Glycerine of Borax.* (Borax in powder, an ounce; glycerine, four fluid ounces; distilled water, two fluid ounces.)

Glycerinum Plumbi Subacetatis. *Glycerine of Subacetate of Lead.* (Acetate of lead, five ounces; oxide of lead, three ounces and a half; glycerine, one pint; distilled water, twelve fluid ounces. Mix together and boil for a quarter of an hour; then filter and evaporate until the water is dissipated.)

Glycerinum Amyli. *Glycerine of Starch.* (Starch, an ounce; glycerine, five fluid ounces; distilled water, three fluid ounces. Mix, heat till a translucent jelly is formed.)

Glycerinum Tragacanthæ. *Glycerine of Tragacanth.* (Tragacanth, one hundred and ten grains; glycerine, one fluid ounce; distilled water, seventy-four fluid grains. Mix and heat until a translucent jelly is formed.)

Glycerine also occurs in the official discs of atropine, cocaine and physostigmine, in some pills, &c.

Therapeutics. *Glycerine* is used on account of its physical properties, as an adjunct to lotions in skin diseases, to prevent the surface becoming dry; also in the form of plasma; it has been proposed as a substitute for sugar in the dietary of diabetic patients. It has likewise been used internally as a substitute for cod liver oil, but without much benefit.

Dose. Of glycerine, 1 fl. drm. to 2 fl. drm.

MANNA. Manna. A concrete saccharine exudation from the incised bark of Fraxinus Ornus; obtained by making incisions in the stems of the trees, which are cultivated for the purpose chiefly in Sicily and Calabria.

Description. Manna of the best description, called flake manna, forms long white pieces not unlike stalactite masses, from one to six inches in length, and about one to two inches broad, hollowed out and discoloured on the side which was attached to the tree; it is porous and friable; it may also occur in small masses, or tears, and when of an inferior kind, in broken and coloured fragments mixed with impurities. Manna has a sweetish odour and taste, but it is also rather bitter.

Prop. & Comp. Manna is soluble in six parts of water; it dissolves also in alcohol, and consists almost entirely of a peculiar sugar, named *Mannite*, $C_6H_8(HO)_6$, which crystallises in four-sided prisms, is sweet, and differs from grape or cane sugar in not fermenting with yeast; a small amount of *bitter matter* also exists in manna, the nature of which is unknown, with some common sugar. The mannite constitutes about eighty per cent. and can be extracted by boiling rectified spirit, from which it separates on cooling in shining crystals.

Therapeutics. A very mild laxative, adapted for children; also a pleasant adjunct to some purgative draughts, though it sometimes causes flatulence and griping. The laxative effect is probably due to the extractive, not to the mannite.

Dose. 60 gr. to 1 oz. or more.

The leaves of Fraxinus Excelsior, or Common Ash (not official), have long been used in medicine, and much extolled in Germany and France in the treatment of gout and rheumatism;

their real composition is unknown. From the author's experience of their effects in acute gout many years ago, he is not at all inclined to think highly of their value, for in several cases they failed to afford the slightest alleviation, when the use of other treatment was immediately followed by relief; in the treatment of chronic gout, when taken for a long time and in large quantities in the form of decoction of the leaves (half an ounce to the pint), they probably may have some influence in keeping off attacks.

LOGANIACEÆ.

NUX VOMICA. The seeds of Strychnos Nux Vomica. Nux vomica, or Koochla Tree; growing in and imported from the East Indies.

STRYCHNINA. Strychnine ($C_{21}H_{22}N_2O_2$), an alkaloid obtained from Nux Vomica.

Description. The fruit is a round berry, like an orange, filled, when ripe, with a jelly-like pulp, and containing the *seeds*, which are round, flattened, and concavo-convex, from seven-eighths of an inch to more than an inch in diameter, very tough and horny, covered with a velvety down consisting of fine hairs; their colour is yellowish-grey, with no odour, but of an intensely bitter taste.

Prop. & Comp. Nux vomica contains two alkaloids, *strychnine* and *brucine*, united with a peculiar acid. Strychnine crystallises in four-sided prisms or octahedra; it requires about one thousand parts of water to dissolve it, but it communicates to it an intensely bitter taste; soluble in boiling rectified spirit and chloroform, but not in absolute alcohol or ether; it forms crystallisable salts with acids. Strychnine yields a colourless solution with pure sulphuric acid, which, on the addition of bichromate of potassium, acquires an intensely violet colour, speedily passing through red to yellow. It is not reddened by nitric acid. Brucine ($C_{23}H_{26}N_2O_4$) crystallises with four equivalents of water; much more soluble in water, but less bitter than strychnine; soluble in alcohol; forms salts with acids; it is coloured red by nitric acid, but does not give the above test with bichromate of potassium. *Igasuric* or *Strychnic* acid is united with the alkaloids; its solution precipitates copper salts bright green; it can be crystallised. A third alkaloid, *Igasurine*, has been stated to exist in nux vomica, which is more soluble in water than strychnine or brucine : recently, Schutzenberger has asserted that many bases, allied to brucine in being reddened by nitric acid, are contained in the seeds of nux vomica; he detected them in the so called Igasurine.

Off. Prep.—Of the Seeds of Nux Vomica.

Extractum Nucis Vomicæ. *Extract of Nux Vomica.* (Nux vomica, one pound; rectified spirit, sixty-four fluid ounces; distilled water, sixteen fluid ounces. Prepared by first heating the seeds to 212° F. (100° C.), reducing them to powder, and subsequently macerating in rectified spirit and water, percolating and evaporating to a proper consistence.) This extract should contain fifteen per cent. of total alkaloid.

Tinctura Nucis Vomicæ. *Tincture of Nux Vomica.* (Extract of nux vomica, one hundred and thirty-three grains; distilled water, four fluid ounces; rectified spirit, a sufficiency. Mix sufficient spirit with water to produce twenty fluid ounces, and dissolve the extract in the mixture.) One fluid ounce contains one grain of the alkaloids of nux vomica.

Of the Alkaloid Strychnine.

Liquor Strychninæ Hydrochloratis. *Solution of Hydrochlorate of Strychnine.* (Strychnine, nine grains; dilute hydrochloric acid, fourteen minims; rectified spirit, half a fluid ounce; distilled water, one fluid ounce and a half.) This solution contains about one per cent. of strychnine.

STRYCHNINE is prepared by the following process. Nux vomica is reduced to powder; this is accomplished by submitting it to the action of steam, and then drying it in a vapour bath or hot air chamber, and grinding it in a coffee mill. The powder is digested with a gentle heat in spirit and water, the spirit distilled off, and a solution of acetate of lead added, by which the colouring matters, resin, igasuric acid, &c., are precipitated, while the acetates of strychnine and brucine remain in solution. The precipitate is separated by filtration, and to the filtered liquid ammonia is added in slight excess, throwing down both the alkaloids; it is allowed to stand for twelve hours, and then the precipitate is collected on a filter, washed and dried. The dried product is boiled in rectified spirit till the fluid ceases to taste bitter; the greater part of the spirit is then distilled off, and the liquid evaporated to a small bulk and set aside to cool. The yellowish mother liquid, containing the brucine, is poured off from the white crust of strychnine, the white crust thrown on a filter and, to remove traces of brucine, washed with two parts of rectified spirit and one of water till the washings no longer become red with nitric acid. The strychnine is finally dissolved by boiling in rectified spirit, and the solution set aside to crystallise.

Therapeutics. The action of nux vomica is chiefly, if not wholly due to the *Strychnine* it contains. This alkaloid exaggerates the reflex excitability of the spinal cord, so that the most trifling stimulus excites tetanic spasms. This effect is manifested both in cold-blooded and warm-blooded animals. It does not directly influence the cerebral centres, the motor nerves, the voluntary muscles, or the heart. It is said to cause contraction of the peripheral arterioles and a rise of blood-pressure. *Brucine* resembles strychnine in its physiological action, but is far less powerful. Crum Brown and Fraser have shown that the methyl and ethyl derivatives of strychnine and brucine possess no convulsant properties, but cause death by paralysing the end-organs of the motor nerves in a manner analogous to curare.

In man, strychnine causes twitching and rigidity of the muscles, followed by tetanic paroxysms, without loss of consciousness. In the intervals between the paroxysms, the muscles are relaxed. Death may ensue from exhaustion between the fits of spasm, or from apnœa during a paroxysm, owing to protracted rigidity of the muscles of respiration. Paralysed parts are more readily affected by the alkaloid than those which are sound. Strychnine is eliminated in the urine. Brucine appears to be clinically inert; from the author's experience, it does not, *when pure*, produce any of the effects of strychnine, even in large doses; it is perhaps tonic and antiperiodic.

The fatal effects of an overdose of strychnine have been averted by the administration of chloroform, chloral, and physostigmine, and by keeping up artificial respiration.

It acts as a bitter stomachic, and often relieves in some forms of dyspepsia, as in pyrosis; it likewise appears to give tone or contractile power to the intestines, and when combined with purgatives increases their power and effectiveness. Nux vomica is much used in the treatment of paralysis, more especially when depending on lead poisoning, and in other forms of local paralysis, such as atony of the bladder; sometimes, however, it is employed in paraplegia, and even in hemiplegia, when all inflammatory symptoms have subsided. Nux vomica is also of service in giving tone to the muscular system, in cases where debility has arisen after severe illnesses, such as rheumatic fever. It has been found to have considerable power in relieving some functional affections of the nervous system, as low spirits of an hysterical character; also to give tone in impotence from nervous exhaustion; its power as an aphrodisiac is often well marked. Lastly, this remedy is used in some forms of chorea and other spasmodic affections.

Dose. Of powdered nux vomica, 2 gr. to 5 gr.; of the extract, $\frac{1}{4}$ gr. to 1 gr.; of the tincture, 10 min. to 20 min.; of strychnine, $\frac{1}{30}$ gr. to $\frac{1}{12}$ gr., cautiously increased; of the solution, 5 min. to 10 min. or more. Some patients are extremely sensitive to the action of nux vomica and strychnine; the author has seen 10 min. of the tincture of nux vomica and $\frac{1}{48}$ gr. of the alkaloid cause severe symptoms. For hypodermic administration, $\frac{1}{120}$ to $\frac{1}{60}$ gr. of strychnine dissolved in an acid may be employed.

Adulteration of strychnine. The presence of *brucine*, in varying and sometimes large quantities, rendering the alkaloid much less powerful, is detected by the red colour produced by nitric acid. The bark of strychnos nux vomica contains the same alkaloids as the seeds; it is known as False Angustura Bark, being sometimes employed to adulterate the true Angustura Bark; for the method of distinguishing this adulteration (*vide* Cusparia, p. 234).

The Pharmacopœia gives the following test for determining the amount of total alkaloid present in the extract:—Dissolve ten grains of the extract in half a fluid ounce of water, and add a drachm of carbonate of sodium previously dissolved in half a fluid ounce of water, and half a fluid ounce of chloroform; agitate, warm gently, and separate the chloroform. Add to this half a fluid ounce of dilute sulphuric acid with an equal bulk of water; again agitate, warm and separate the acid liquor from the chloroform. To this acid liquor add now an excess of ammonia and agitate with half a fluid ounce of chloroform; when the liquors have separated, transfer the chloroform to a weighed dish, and evaporate the chloroform over a water-bath. Dry the residue for one hour, and weigh. Ten grains of the extract should yield $1\frac{1}{2}$ gr. of total alkaloid. In this test chloroform is employed as a solvent for the alkaloids; they are then combined with sulphuric acid, liberated by ammonia, again dissolved in chloroform, and freed from the latter by evaporation.

FABA SANCTI IGNATII. St. Ignatius' Bean. The seed of the Strychnos Ignatia; inhabiting the Philippine Islands. (Not official.)

Description. The seeds are of a brown colour, about the size of olives, semi-transparent, of a tough horny texture; convex on one side; somewhat triangular, with irregular facets on the other.

Prop. & Comp. These beans are remarkable for the large proportion of strychnine they contain, the quantity being greater than that yielded by the nux vomica seeds. They yield about 1·2 per cent. of this alkaloid, to the presence of which their activity is due ; they also contain *Brucine.*

Therapeutics and Use. St. Ignatius' Beans are often used as a source of strychnine. An extract has been prepared from them, and given as a remedy ; it is thought by some to differ in its properties from that of nux vomica, but there can be no doubt the difference is in degree only, strychnine being the active ingredient.

GELSEMIUM. Yellow Jasmine. The dried rhizome and rootlets of Gelsemium nitidum (Gelsemium sempervirens), the Yellow Jasmine ; growing in the Southern States of North America.

Description. The rhizome is nearly cylindrical, from half an inch to six inches or more in length, with small rootlets attached to or mixed with the larger pieces ; light yellowish-brown externally, and marked longitudinally by dark purple lines ; fracture splintery ; bark thin, with silky fibres in its liber, closely attached to a pale yellow, porous woody axis, with evident medullary rays, and with or without pith. Odour somewhat narcotic and aromatic ; taste bitter.

Prop. & Comp. The active properties of the root are due to an alkaloid, *gelsemine*, found in combination with *gelseminic acid.* The alkaloid has been isolated as a colourless, amorphous solid, intensely bitter, and with strong basic properties. The root also contains a *resin*, devoid of specific properties.

Off. Prep. **Extractum Gelsemii Alcoholicum.** *Alcoholic Extract of Gelsemium.* (Gelsemium, in very fine powder, one pound ; rectified spirit and distilled water, of each a sufficiency. Prepared by maceration with two pints of spirit, percolation, and evaporation.)

Tinctura Gelsemii. *Tincture of Gelsemium.* (Gelsemium, in fine powder, two ounces and a half ; proof spirit, one pint.)

Therapeutics. Gelsemium acts chiefly on the nervous system. In cold-blooded animals, it causes first sensory, then motor paralysis, by its action on the spinal cord. In warm-blooded animals and man it acts primarily on the motor tract of the cord, causing loss of power over the voluntary muscles. It does not affect the end-organs of the motor nerve, or diminish idiomuscular contractility. The anæsthetic property of the drug is not manifested in warm-blooded animals unless it is given in poisonous doses. Death results from apnœa, due to paralysis of the respiratory muscles. The cerebral functions and the heart are not directly influenced.

The action of gelsemium is somewhat like that of conium; it differs from the latter, however, in acting primarily on the nerve-centres, instead of their end-organs, and in affecting the sensory as well as the motor functions.

It has been employed in various forms of neuralgia, rheumatism, and muscular spasm, as a sedative. Fatal results have occurred from an over-dose. Though much used in America, it has hitherto been little investigated in this country.

Dose. Of gelsemium, 5 gr. to 30 gr.; of the extract, ½ gr. to 2 gr.; of the tincture, 5 min. to 20 min., or more.

ASCLEPIADACEÆ.

HEMIDESMI RADIX. Hemidesmus Root. The dried root of Hemidesmus Indicus. Indian Sarsaparilla. Native of and imported from India.

Description. In yellowish brown long cylindrical pieces; the colour of the cortex is dark, marked by longitudinal divisions and deep circular rings; the central portion ligneous; it has a somewhat fragrant odour, and a sweetish slightly acrid taste.

Prop. & Comp. It yields its active properties to boiling water, and contains a peculiar volatile, crystallisable substance, with acid properties: this has been called hemidesmic acid, but little is known concerning it.

Off. Prep. **Syrupus Hemidesmi.** *Syrup of Hemidesmus.* (Hemidesmus, four ounces; refined sugar, twenty-eight ounces; boiling distilled water, twenty fluid ounces.) Sp. gr. 1·335.

Therapeutics. Its action is supposed to be the same as that of sarsaparilla, and it has been used as a substitute for that root, especially in India, in syphilitic cutaneous eruptions, &c., and also in some diseases of the kidney.

Dose. Of the syrup, 1 fl. drm. The syrup of hemidesmus must be looked upon more as a flavouring than a medicinal agent, as the amount of the drug contained in an ordinary dose of this preparation is very small.

A decoction may be made from it, in lieu of sarsaparilla, when the real action of hemidesmus is required. Dose from 1 fl. oz. to 4 fl. oz.

CONDURANGO. The dried stems and bark of Gonolobus Condurango (not official). Indigenous in Ecuador and other parts of South America. Imported from New York.

Description. Pieces of dried stems, an inch to an inch and a half in diameter, consisting of a light-coloured wood enclosing a small central pith, from which numerous medullary rays radiate towards the exterior. Bark rather thick, light brownish-grey, longitudinally wrinkled, blotched with lichens. Smell not unlike that of cascarilla. When chewed, has a slightly bitter, mawkish taste.

Therapeutics. This drug was introduced into this country as a remedy for cancer. Careful trials made at the Middlesex Hospital by Campbell de Morgan and Hulke have shown that it exerts no appreciable influence on the disease. No physiological effects were noticed even after large doses of the decoction and the fluid extract of the bark. Brunton believes that the quickened respiration and opisthotonos observed in animals after injecting solutions of condurango into the veins, are due to impaction of solid particles in the pulmonary capillaries, rather than to any direct toxic action of the drug.

SOLENOSTEMMA ARGEL, the leaves of which have been referred to as constituting one of the adulterations of senna, belongs to this natural order.

GENTIANACEÆ.

GENTIANÆ RADIX. Gentian Root. The dried root of Gentiana lutea, or Yellow Gentian; growing chiefly in the European Alps and Pyrenees: imported from Marseilles and other French ports.

Description. The root occurs in lengthened cylindrical pieces, from ½ inch to 1 inch in diameter, and several inches long; wrinkled longitudinally, and often twisted; brown externally, yellow and spongy, yet tough, within. Of a sweet odour, and bitter and sweet taste.

Prop. & Comp. Gentian yields to water and spirit its bitter principle, *gentianite*, which has not been crystallised, also *gentianin* or gentianic acid ($C_{14}H_{10}O_5$), which is not bitter and can be crystallised in yellow needles, whose colour is deepened by alkalies; formerly this was supposed to be the active principle. Sugar, gum, and pectin, &c., are also present in gentian root.

Off. Prep. **Extractum Gentianæ.** *Extract of Gentian.* (Gentian root, sliced, one pound; boiling distilled water, one gallon. Prepared by maceration and subsequent decoction, and reduction by evaporation to a proper consistence for making pills.)

Infusum Gentianæ Compositum. *Compound Infusion of Gentian.* (Gentian root, sliced, and bitter orange peel, each fifty-five grains; fresh lemon peel, a quarter of an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Gentianæ Composita. *Compound Tincture of Gentian.* (Gentian root, one and a half ounce; bitter orange peel, three quarters of an ounce; cardamom seeds, a quarter of an ounce; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Gentian is a simple bitter, or stomachic tonic, improving the appetite and giving tone to the stomach; hence useful in convalescence from acute disease, and in cases of dyspepsia attended with an atonic condition of that viscus.

Dose. In substance from 10 gr. to 30 gr.; of extract, 2 gr. to 10 gr.; of the compound infusion, 1 fl. oz. to 2 fl. oz.; of the compound tincture, ½ fl. drm. to 2 fl. drm.

CHIRATA. Chiretta. The entire plant, Ophelia Chirata; growing in the northern parts of India.

Description. As imported, it is in bundles consisting of the stems of the plant, about 3 feet long, about the size of a goose quill; smooth, pale-brown, with numerous small flowers, and part of the roots attached; the stems have a yellow pith.

Prop. & Comp. The plant is very bitter, and yields to water and alcohol a bitter extractive, similar to that obtained from gentian.

Off. Prep. **Infusum Chiratæ.** *Infusion of Chiretta.* (Chiretta, a quarter of an ounce; distilled water, at 120° F. (48°·9 C.), ten fluid ounces.)

Tinctura Chiratæ. *Tincture of Chiretta.* (Chiretta, two and a half ounces; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Exactly the same as gentian.

Dose. Of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture, ½ fl. drm. to 2 fl. drm.

Other plants belonging to this order, as ERYTHRÆA CENTAURIUM, the Common Centaury, and MENYANTHES TRIFOLIATA, the

Common Buck-bean, contain a similar bitter principle, and have been occasionally employed in the place of gentian root.

CONVOLVULACEÆ.

SCAMMONIÆ RADIX. Scammony Root. The dried root of Convolvulus Scammonia. Growing in Syria and Asia Minor, and exported chiefly from Smyrna.

SCAMMONIUM. Scammony, a gum resin, exuding from the cut and living root of Convolvulus Scammonia, chiefly in Asia Minor.

SCAMMONIÆ RESINA. Resin of Scammony. A resin obtained from dry Scammony Root, or from Scammony itself, by means of rectified spirit.

Description. The *root* is tap-shaped, sometimes three inches in diameter at the top, brown without, white within, odour and taste faint, somewhat resembling jalap. Ether agitated with the powder and evaporated leaves a residue having the properties of scammony resin.

Scammony occurs in masses, irregular in shape and size, of a blackish-green colour, covered with a fine greyish-white powder, porous, brittle, with a shining fracture. It makes a lather when rubbed on the surface with water ; odour musty ; taste nauseous and acrid after a few minutes. It is easily triturated, and forms an emulsion with water. The *resin* obtained from scammony root or scammony is in brownish, translucent pieces, brittle, resinous in fracture, and if prepared from the root, of a sweet fragrant odour.

Prop. & Comp. Scammony consists chiefly of a *resin*, Jalapin, sometimes in the form of a glucoside, sometimes in part as a resinous acid ; the latter is soluble in ammonia ; scammony resin is soluble in alcohol and ether, but precipitated from its solution on the addition of water. The remaining portion of pure scammony which is not soluble in ether consists chiefly of *gum*.

Scammony should emit no bubbles of gas when treated with hydrochloric acid, nor should a cooled decoction be tinged of a blue colour on the addition of iodide of potassium and dilute nitric acid, or free iodine. Of pure or virgin scammony, about 75 per cent. should be soluble in ether. The above tests show the absence of chalk or starch, and also the amount of resin. The resin cannot form singly an emulsion with water, as it contains no gum. Its tincture should not render the fresh cut surface of a potato blue; this shows the absence of guaiacum, with which it is often adulterated.

Off. Prep.—Of the Root.

Scammoniæ Resina. *Resin of Scammony.* (The resin is prepared by exhausting the root by maceration and percolation with rectified spirit. The tincture thus made is diluted with water, and the spirit distilled off. The residue is allowed to become cold, the supernatant fluid poured off, the resin washed two or three times with hot water, and dried on a porcelain plate.)

It may also be prepared in a similar way from scammony.

Of Scammony.

Mistura Scammonii. *Scammony Mixture.* (Made by triturating six grains of scammony with two fluid ounces of milk, so as to form a uniform emulsion. The mixture should be made as required for use.)

Of Resin of Scammony.

Confectio Scammonii. *Confection of Scammony.* (Resin of scammony, six ounces; ginger, three ounces; oil of caraway, two fluid drachms; oil of cloves, one fluid drachm; syrup, six fluid ounces; clarified honey, three ounces.)

Pilula Scammonii Composita. *Compound Scammony Pill.* (Resin of scammony, and resin of jalap, of each one ounce; curd soap, one ounce; strong tincture of ginger, one fluid ounce; rectified spirit, two fluid ounces.) This is the only aperient pill in the Pharmacopœia which does not contain aloes.

Pulvis Scammonii Compositus. *Compound Scammony Powder.* (Scammony resin, four ounces; jalap, three ounces; ginger, one ounce. Rub them separately into a very fine powder, and mix.

Scammony resin also forms an important ingredient in extractum colocynthidis compositum, in pilula colocynthidis composita, and pilula colocynthidis et hyoscyami.

Therapeutics. A drastic purgative, generally causing much watery discharge, and often griping; useful to give activity to other purgatives, which appear to diminish its violence. It is employed in cerebral and dropsical effusions, torpidity of bowels and as a vermifuge for children; it is contra-indicated in inflammatory affections of the digestive organs.

Dose. Of powdered scammony (pure), 5 gr. to 10 gr.; of resin of scammony, 3 gr. to 8 gr.; of the confection of scammony, 10 gr. to 30 gr. or more; of the mixture of scammony, 1 fl. oz. to 3 fl. oz.; of compound scammony pill, 5 gr. to 15 gr.; of the compound powder of scammony, 10 gr. to 20 gr. As an adjunct to other purgatives it may be given in smaller quantities.

Adulteration. Scammony is most extensively adulterated with *chalk*, *flour*, other *resins*, and *extracts*. Sometimes the drug contains but a small percentage only of real scammony. The frauds may be detected by the tests given above.

JALAPA. Jalap. The dried tubercles of Ipomœa Purga (Exogonium Purga), true Jalap plant; imported from Mexico; it was named from the city Xalapa. True Jalap is known commercially as Vera Cruz Jalap; another kind has lately been introduced, Tampico Jalap, from Ipomœa simulans.

JALAPÆ RESINA. Resin of Jalap. A resin obtained from Jalap by means of rectified spirit.

Description. Jalap tubers are ovoid, more or less pointed, varying from half an inch to three or four inches in diameter, from the size of a nut to that of an orange; of a brown colour, and wrinkled externally; internally yellowish-grey, and with dark brown, irregular, concentric layers. Structure dense and resinous in appearance; occasionally it is found worm-eaten. Sometimes the tubers are sliced.

The *Resin of Jalap* is in dark brown opaque fragments, translucent at the edges, breaking with a resinous fracture, and readily reduced to a pale brown powder.

Prop. & Comp. *Jalap* has a sweetish odour and taste, at the same time nauseous; it contains not less than 10 per cent. of resin, usually about 15 per cent., and likewise about 20 per cent. of a watery extractive matter, with starch, &c. *Jalap resin* is insoluble in water; soluble in alcohol, but only partially so in ether; it becomes crimson with oil of vitriol. Jalap resin from the true jalap plant contains *Convolvulin* (Rhodeoretin) ($C_{31}H_{50}O_{16}$), a strongly purgative substance; homologous with jalapin from the fusiform root. It differs from jalapin in being colourless and transparent, and insoluble in ether. It dissolves in aqueous solutions of the alkalies, forming salts of convolvulic acid.

Jalapin, or Pararhodeoretin ($C_{34}H_{56}O_{16}$), is the chief constituent of spurious or fusiform jalap. It is soluble in alcohol and ether, and but little soluble in water. By acting on jalapin with alkaline solutions, salts of jalapic acid are produced.

Both these resins are present in each variety of jalap, but in different proportions.

The so termed jalapin of the shops is the resin of jalap extracted by spirit from the tuber, and afterwards precipitated by means of water.

Off. Prep. **Extractum Jalapæ.** *Extract of Jalap.* (This is a mixed spirit and cold water extract, made by treating the powdered jalap first with rectified spirit, and afterwards with cold water, evaporating the tincture and watery solution separately to a soft state, and afterwards mixing them together, and evaporating the whole at a temperature not exceeding 140° F. (60° C.) to a suitable consistence for forming pills).

Pulvis Jalapæ Compositus. *Compound Powder of Jalap.* (Jalap, in powder, five ounces; acid tartrate of potassium, nine ounces; ginger, in powder, one ounce.)

Tinctura Jalapæ. *Tincture of Jalap.* (Jalap, powdered, two ounces and a half; proof spirit, one pint. Prepared by maceration and percolation. Proof spirit takes up both the resin and watery extract.

Jalap is also an active ingredient in pulvis scammonii compositus. The resin of jalap is contained in pilula scammonii composita.

Therapeutics. Jalap is a brisk purgative, causing watery discharge; much allied to, but less irritant than, scammony; its action appears to be exerted more upon the small than the large intestines. Jalap is used as an ordinary purgative in costiveness and inflammatory affections, especially when combined with aromatics, which diminish the griping; it is also given as a hydragogue in dropsies, especially when joined with the acid tartrate of potassium or calomel; on account of its little taste jalap is a convenient purgative for children, and frequently given as a vermifuge.

Dose. Of the powder, 10 gr. to 30 gr.; of the resin, 2 gr. to 5 gr.; of the extract of jalap, 5 gr. to 15 gr.; of the compound powder, 20 gr. to 60 gr.; of the tincture of jalap, ½ fl. drm. to 2 fl. drm.

Adulteration. Other roots, as of Ipomœa orizabensis, &c., distinguished by the absence of the characters of true jalap.

SOLANACEÆ.

CAPSICI FRUCTUS. Capsicum Fruit. The dried ripe fruit of Capsicum fastigiatum; Guinea Pepper, Pod Pepper, Chillies; imported from Zanzibar.

Description. A small oblong, cylindrical or conical membranous pod, of a bright scarlet or orange-red colour, shining, but somewhat corrugated on the surface, divided internally into two or three cells, containing some spongy pulp and numerous white flat, reniform seeds. This fruit is from half to three-quarters of an inch long, and about a quarter of an inch broad.

Prop. & Comp. No odour, taste hot and acrid. It contains a volatile principle, *capsicin*, somewhat like a concrete volatile oil, which is soluble in alcohol, ether, essential oils, and slightly so in water; intensely hot in taste, and crystallisable when pure; it possesses basic properties, and forms crystallisable salts with some vegetable and mineral acids. The pod also contains an alkaloid resembling conine in odour, and a red extractive or colouring matter, of which little is known.

Off. Prep. **Tinctura Capsici.** *Tincture of Capsicum.* (Capsicum, three quarters of an ounce; rectified spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Capsicum acts as a powerful topical stimulant, and also on the general system; used chiefly as a condiment, sometimes in atonic dyspepsia, diarrhœa, and extreme prostration; as a gargle in cynanche maligna and scarlatina; externally it can be used as a rubefacient.

Dose. Of powder, $\frac{1}{2}$ gr. to 1 gr. in pills; of tincture, 10 min. to 20 min. As a gargle, $\frac{1}{2}$ fl. drm. to 2 fl. drm. in 5 oz. of fluid.

Adulteration. The powdered capsicum (cayenne pepper) has been extensively adulterated with red lead and other coloured substances.

ATROPACEÆ.

BELLADONNÆ FOLIA. Belladonna Leaves. The fresh and dried leaves, with the branches to which they are attached, of Atropa Belladonna, or Deadly Nightshade; also the leaves separated from the branches and carefully dried; gathered when the fruit has begun to form, from plants either cultivated or growing wild in Britain.

BELLADONNÆ RADIX. Belladonna Root. The dried root of Atropa Belladonna; cultivated in Britain or imported from Germany.

ATROPINA. Atropine. $C_{17}H_{23}NO_3$. A crystalline alkaloid, obtained from Belladonna.

Description. The *leaves* are alternate, 3 to 8 inches long, ovate, acute, entire, smooth, and soft, fœtid when bruised; the upper ones placed in pairs, unequal in size; the *root* is from 1 to 2 feet long, from ½ an inch to 2 inches thick, tapering, and branched; generally marked at the upper end by the hollow bases of the stems; its colour is brownish white. It breaks with a short fracture, exposing a thin yellowish cortical portion, separated by a dark line from a brownish central portion, which is marked by darker coloured dots, and devoid of medullary rays. The uncultivated plant is stated to be preferable to the cultivated; an infusion of either dropped into the eye dilates the pupil.

Prop. & Comp. All parts of the plant contain the official alkaloid, *Atropine* ($\mathbf{C_{17}H_{23}NO_3}$), which occurs in white crystalline acicular prisms; soluble to some extent in water, freely in chloroform, alcohol, and in ether; its solution in water has an alkaline reaction, a bitter taste, and yields a citron-yellow precipitate with perchloride of gold. If pure, it is entirely dissipated by heat. Atropine probably exists in the plant in combination with malic acid. Other principles have been described, as *Belladonnine*, &c., but little is known about them.

Off. Prep.—Of the Leaves.

Extractum Belladonnæ. *Extract of Belladonna.* (A green extract prepared from the juice of the leaves and young branches of belladonna.)

Succus Belladonnæ. *Juice of Belladonna.* (Seven pounds of the fresh leaves and young branches are bruised in a mortar, and to every three parts by measure of the juices, one part of rectified spirit is added.) Must be kept in a cool place.

Tinctura Belladonnæ. *Tincture of Belladonna.* (Belladonna leaves, in coarse powder, one ounce; proof spirit, one pint. Prepared by maceration and percolation.)

Of the Root.

Atropina. *Atropine.* This alkaloid is prepared by exhausting the recently dried root with rectified spirit, and precipitating the colouring matter and organic acid by means of lime. The filtered solution is then treated with sulphuric acid; this throws down any excess of lime, and converts the impure alkaloid into a sulphate. Three-fourths of the spirit are then distilled off, water added, and the liquid evaporated at a gentle heat till it no longer smells of alcohol. The aqueous solution of sulphate of atropine is still acid from the presence of sulphuric acid. Carbonate of potassium is then added cautiously, to render the fluid *nearly neutral;* this precipitates a resin which prevents the crystallisation of the alkaloid. The fluid is then set aside for six hours and filtered. The filtrate is rendered *strongly alkaline* with carbonate of potassium, which liberates the atropine; it is then shaken up with chloroform; the chloroform, with the alkaloid dissolved in it, is allowed to subside, and is then drawn off and distilled in a water-bath. The residue of impure atropine is dissolved in warm rectified spirit, and finally decolorised with a little animal charcoal. The solution is filtered and allowed to evaporate. The pure alkaloid now crystallises out. Two pounds of the root should yield about forty grains of atropine.

Linimentum Belladonnæ. *Liniment of Belladonna.* (Belladonna root, in fine powder, twenty ounces ; camphor, one ounce ; rectified spirit, sufficient to make thirty fluid ounces. Prepared by maceration and percolation.)

Extractum Belladonnæ Alcoholicum. *Alcoholic Extract of Belladonna.* (Prepared from belladonna root coarsely powdered, rectified spirit and distilled water, by maceration, percolation, and evaporation.)

Emplastrum Belladonnæ. *Belladonna Plaster.* (Alcoholic extract of belladonna, four ounces ; resin plaster and soap plaster, of each eight ounces.)

Unguentum Belladonnæ. *Ointment of Belladonna.* (Alcoholic extract of belladonna, fifty grains ; benzoated lard, one ounce.)

Of Atropine.

Unguentum Atropinæ. *Ointment of Atropine.* (Eight grains of atropine dissolved in half a fluid drachm of rectified spirit, and made into an ointment with one ounce of benzoated lard.)

Atropinæ Sulphas. *Sulphate of Atropine.* (Atropine, a hundred and twenty grains ; distilled water, four fluid drachms ; dilute sulphuric acid, a sufficiency. Add the acid to the atropine mixed with the water until the alkaloid is dissolved and the fluid is neutral. Evaporate to dryness at a temperature of 100° F. (37°·8 C.).

A colourless powder, more soluble in water than atropine, forming a solution which is neutral to test paper, and when applied to the eye dilates the pupil in the same manner as the solution of atropine. It leaves no ash when burned with free access of air.

Intended for external application and subcutaneous injection.

Liquor Atropinæ Sulphatis. *Solution of Sulphate of Atropine.* (Sulphate of atropine, nine grains ; distilled water, sixteen and a half fluid drachms.) The strength is one per cent. It was one in one hundred and nine in B. P., 1867.

Lamellæ Atropinæ. *Discs of Atropine.* (Discs of gelatine, with some glycerine, each weighing about a fiftieth of a grain, and containing one five-thousandth part of a grain of sulphate of atropine.)

Therapeutics. The physiological action of belladonna is exclusively due to the atropine it contains. It must be remembered that the pigeon, the dog, and especially the rabbit, are singularly insusceptible to the action of this alkaloid ; 15 gr. being the minimum fatal dose for the last-mentioned animal. Hence experimental results must not be too hastily extended to the human organism.

Topically applied to the frog's web, atropine causes contraction of the arterioles, followed by stasis of blood in the veins, which soon extends to the arteries—anæmia, followed by congestion. Applied to the conjunctiva, it dilates the pupil and impairs accommodation ; both effects being probably due to paralysis of the terminal filaments of the motor oculi nerve. The same effects on the iris and ciliary muscle are produced by atropine when introduced into the blood; but they are now symmetrical instead of being unilateral.

A small dose of the alkaloid, injected into the jugular vein of a dog, quickens the cardiac and respiratory movements, at the same time raising the blood-pressure in the arteries. The first of these phenomena is due to a selective action upon the cardiac inhibitory filaments of the vagi, which are paralysed by the drug; the second, to stimulation of the respiratory centre in the medulla oblongata; the third, to contraction of the systemic arterioles, probably through the medium of the sympathetic.

Atropine exerts both a paralysing and a stimulant action upon the spinal cord; but the former is greater in amount than the latter. Accordingly, to demonstrate its spinal-stimulant powers, we have recourse to an animal whose respiratory muscles may be paralysed without causing death. In the frog, a dose below the fatal minimum, paralyses, first the cutaneous sensory nerves, next the motor nerves and spinal cord; it does not impair idio-muscular contractility. The only remaining sign of life is the persistent, though feeble, beating of the heart. After the lapse of a variable number of hours or days, tetanic symptoms, not unlike those caused by strychnine, are developed. These are due to an excitant action of the alkaloid upon the spinal cord. This curious succession of paralysis and spasm may be imitated by the administration of a pure convulsant, such as strychnine, together with a purely paralysing agent, such as methyl-strychnine. In warm-blooded animals, the two sets of phenomena are manifested simultaneously. (Fraser.)

Atropine causes purging and diuresis in dogs. It is eliminated in the urine, in which its presence may be readily demonstrated. It checks all other secretions, such as milk, saliva, &c. Its action on the submaxillary gland has been studied by Heidenhain, who found that it arrested secretion by paralysing the terminal filaments of the chorda tympani. This paralysis may be removed by the subsequent administration of an appropriate dose of physostigmine.

Fraser and Crum Brown have shown that the methyl and ethyl derivatives of atropine resemble the latter alkaloid in their action on the pupil, and on the cardiac inhibitory fibres of the vagi; they differ from it, however, in causing no diuretic or cathartic effects, and in exerting no stimulant action on the cord. Methyl- and ethyl-atropine prove fatal in smaller doses than atropine ; they cause paralysis without co-existent or consequent spasm ; and this paralysis is wholly due to a selective action upon the end-organs of the motor nerves, the sensory nerves and cord remaining unaffected.

The action of atropine is stated to be antagonistic to that of opium, hydrocyanic acid, and physostigmine.

1°. As regards opium. It has been asserted by Dr. Anderson, that in cases of poisoning by opium, belladonna may be usefully employed as an antidote ; the clinical evidence of the truth of this statement is not very satisfactory, as most of the sufferers from opium poisoning thus treated have died.

Opium and belladonna are undoubtedly antagonistic in some of their effects, but not in all. Opium given internally in full doses causes contraction of the pupil ; belladonna, dilatation ; but opium, when applied to the conjunctiva, causes no more contraction than any other irritant, *i.e.*, no lasting contraction ; whereas belladonna causes a well marked dilatation when thus applied. [E. H. Webber found that irritation at the margin of the cornea causes partial dilatation of the pupil. Irritation in the middle of the cornea causes rather contraction of the pupil. (Brunton.)] Again, opium given in many painful affections, as in spasm, relieves both pain and spasm ; belladonna often does the same ; and there has been no good evidence afforded that the combination of opium and belladonna is less effectual than either of the drugs given alone. There is one other point in which opium and belladonna appear to be somewhat opposed in action ; namely, in their effect upon the bowels ; opium usually producing constipation, while belladonna has a tendency, though only occasionally observed, to cause looseness of the bowels. Furthermore, opium acts very powerfully upon children ; belladonna is far more readily borne by young subjects than by adults.

2°. The primary lethal action of hydrocyanic acid is said by Preyer to be antagonised by atropine. The former poison interferes with the respiratory function by stimulating the pulmonary terminations of the vagi and depressing the activity of the respiratory centre in the medulla oblongata ; it embarrasses the heart by over-stimulation of the cardiac terminations of the vagi. Atropine, which paralyses the cardiac inhibitory and the pulmonary fibres of the vagi, and stimulates the respiratory centre, may thus be expected to serve as an antidote to prussic acid. The clinical value of Preyer's results is still in need of confirmation.

3°. The physiological antagonism between atropine and physostigmine has been fully established by the elaborate researches of Dr. Fraser. He has shown that within certain limits of time and dose, the fatal effect of either poison may be prevented by the simultaneous or subsequent administration of the other. Beyond those limits, however, the antidotal power ceases. This is probably due to the fact that the one drug does not neutralise all the effects of the other, but only some of them; and if the non-neutralised residue of toxic action reach a certain pitch, it suffices to cause death.

When belladonna is taken by a healthy man, the first effect he observes is dryness of the throat, thirst, and difficulty of swallowing; if he continues the drug, or takes larger doses, the pupils are dilated, and the power of accommodation impaired; his vision becomes indistinct for near objects. The further effects of the drug are: an erythematous rash, not unlike that of scarlet fever, dryness of the skin, acceleration of the pulse, vertigo, sleeplessness, excitement passing into delirium, generally of a harmless character, and attended by hallucinations and confusion of speech. The bowels may be relaxed, and there may be frequent need to pass water. Beyond this, belladonna produces muscular weakness and tremors, hurried breathing, convulsions, coma, and death. It exerts no appreciable influence on the heat of the body.

Belladonna and its alkaloid may be topically applied to relieve pain, to check secretion, to moderate inflammatory action, and for certain ophthalmic purposes:

1°. Belladonna plasters and fomentations are of use in certain forms of hyperæsthesia and neuralgia, especially when due to spinal irritation.

2°. Applied to the female breast, it checks the secretion of milk. Applied to the skin of any part of the body, it checks sweating: *e.g.*, the sweating of the head in rickets (Ringer).

3°. It is said to exert a favourable influence on carbuncles, and even to check suppuration if applied early enough to the inflamed part.

4°. In ophthalmic practice it is used:—

(*a*) To dilate the pupil for ophthalmoscopic examination. In early stages of central cataract to admit more light into the eye. In iritis, to prevent posterior synechiæ. To counteract the effect of calabar bean.

(*b*) To paralyse accommodation—as in hypermetropia.

(*c*) Formerly, to reduce intra-ocular tension in glaucoma. More recent experience has shown that tendency to glaucoma is increased by atropine, and that doses sufficient to dilate the pupil, increase the tension.

It is worthy of notice that atropine, applied to the conjunctival surface, may be absorbed, sometimes, though rarely, giving rise to constitutional effects.

As a constitutional remedy, belladonna may be given in the form of extract, tincture, or juice; the sulphate of atropine should be reserved for subcutaneous injection. Belladonna is administered:

1°. As an antidote in poisoning by opium, prussic acid, or physostigmine.

2°. As a laxative in chronic constipation.

3°. To check incontinence of urine in children and paraplegic patients.

4°. To check profuse sweating. Dr. Ringer found that the hypodermic injection of $\frac{1}{200}$ gr. of atropine arrested sweating for a whole night in a case of phthisis.

5°. In the idiopathic (non-mercurial) salivation of children.

6°. In many nervous disorders: epilepsy, chorea, pertussis, laryngismus stridulus, asthma.

7°. To allay pain and spasm in neuralgic affections, gastrodynia, colic, and spasm of the different sphincters, as of the uterus, bladder, and rectum.

8°. To diminish polyuria in diabetes insipidus and mellitus.

9°. Belladonna has been said to act as a prophylactic against scarlatina, more especially by homœopathic practitioners; but in addition to other evidence against this idea, a case once occurred in the hospital practice of the author, where a child, who at the time was fully under the influence of belladonna administered for epilepsy, caught scarlatina from another patient who came into the institution suffering from that disease.

Dose. O the extract, $\frac{1}{4}$ gr. to 1 gr.; of the alcoholic extract, $\frac{1}{16}$ gr. to $\frac{1}{4}$ gr.; of the tincture, 5 min. to 30 min.; of the juice, 5 min. to 15 min.

Atropine is unsuitable for internal administration; if prescribed, the dose should be from $\frac{1}{100}$ gr., carefully increased. The author has seen very uncomfortable symptoms resulting from $\frac{1}{25}$ gr. If injected under the skin, the amount should be from $\frac{1}{250}$ gr. upwards. The sulphate of atropine is employed only for the preparation of the discs of atropine and of the solution, which is much used by ophthalmic surgeons, because it is free from alcohol. The extract or ointment of belladonna smeared round the eye may be used for the same purpose.

Incompatibles. Caustic fixed alkalies, as soda and potash, when in contact with preparations of belladonna or atropine, destroy their activity by causing the decomposition of the atropine contained in them.

In 1858, the author sent two communications to the Medico-Chirurgical Society on the influence of liquor potassæ and other caustic alkalies upon the therapeutic properties of henbane, belladonna, and stramonium. In the first communication it was shown that—

1. Caustic fixed alkalies, such as exist in liquor potassæ or liquor sodæ, entirely destroy the activity of henbane, preventing its action on the pupil when topically applied, and its influence upon the system when internally administered; and, combined with a proper amount of these alkalies, the largest doses of the preparations of henbane may be given without the production of any symptom.

2. The same influence is exerted by the fixed caustic alkalies upon belladonna and stramonium.

3. The carbonates and bicarbonates of potassium and sodium produce no injurious effect upon the preparations of any of the three above-named plants.

The deductions naturally to be drawn from these results are—

α. That neither liquor potassæ nor any caustic fixed alkali should be prescribed with tincture or extract of henbane, as the virtues of the latter drug are thereby completely neutralised.

β. That when it is desirable to administer an alkaline remedy with henbane, either a carbonate or bicarbonate should be selected, which would probably be equally efficacious upon the stomach if such influence is required, and certainly as efficient in altering the condition of the urine and the mucous membrane of the urinary passages.

γ. That the same precautions should be observed with regard to belladonna and stramonium if at any time prescribed in conjunction with alkalies.

In the second communication it was proved—

1. That the active principles of the plants are absolutely destroyed by the influence of caustic potash.

2. That a certain ratio must exist between the different preparations of the plants and the alkali for the neutralisation to be perfect.

3. That a certain short time is required for the decomposition to be complete.

4. That clinical observation illustrates the influence of the alkali, when mixed with the preparations of these atropaceous plants, in preventing the occurrence of their ordinary symptoms.

STRAMONII SEMINA. Stramonium Seeds. The dried ripe seeds of Datura Stramonium, or Thorn Apple; an indigenous plant growing in waste places and cultivated in Britain.

Description. The *seeds* are about one-sixth of an inch long, brownish-black, reniform, flattened, and rough, feebly bitter and mawkish in taste, inodorous unless bruised, when the smell is disagreeable.

Prop. & Comp. All parts of the plant contain *daturine* ($C_{17}H_{23}NO_3$), an alkaloid identical with atropine. When obtained from the plant, it occurs in white prisms. The author, many years ago, in extracting the alkaloids from corresponding parts of belladonna and stramonium plants, found that the latter yielded a very much smaller amount than the former. It is united with malic acid.

Off. Prep. **Extractum Stramonii.** *Extract of Stramonium.* (Stramonium seeds, in fine powder, one pound; ether, one pint, or a sufficiency; distilled water and proof spirit, of each a sufficiency. Shake the ether in a bottle with half a pint of the water, and after separation decant the ether. Pack the stramonium seeds in a percolator and free them from oil by passing the washed ether slowly through them. Having removed and rejected the ethereal solution, pour the spirit over the residue of the stramonium in the percolator and allow it to pass through slowly until the powder is exhausted. Distil off most of the spirit from the tincture and evaporate the residue by a water-bath until the extract has acquired a suitable consistence for forming pills.)

Tinctura Stramonii. *Tincture of Stramonium.* (Stramonium seeds, two and a half ounces; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. The action of stramonium appears to be exactly the same as that of belladonna; dryness of the throat, dilatation of the pupils, delirium, coma, and death ensue from poisonous doses of the drug. Stramonium has been supposed to influence especially the respiratory organs as an anti-spasmodic, and has been much used in asthma, chiefly in the form of smoke from the burning leaf, employed in the same way as tobacco. The extract has also been used in convulsive coughs as an anti-spasmodic, and as an anodyne in gastrodynia and other painful affections. Several years since, the author made many comparative clinical observations on stramonium and belladonna, and on stramonium and henbane; he could not, however, distinguish between the action of the three plants when they were administered in corresponding doses.

Dose. Of the extract, ¼ gr. to ½ gr.; of the tincture, 10 min. to 30 min. When the dried leaves are smoked, any dryness of the throat or dilatation of the pupils indicates the propriety of discontinuing their use for a time.

Incompatibles. Caustic fixed alkalies, as soda and potash, when in contact with the preparations of stramonium, decompose their active principle, and render them inert in the same manner as when mixed with those of belladonna. (See Belladonna.)

The leaves of the DATURA TATULA, a plant of the same genus as Stramonium, have been much used in the form of a cigarette, or in a pipe, as a remedy for spasmodic asthma; this plant doubtless owes its activity to the same alkaloid as stramonium.

HYOSCYAMI FOLIA. Henbane Leaves. The fresh leaves and flowers, with the branches to which they are attached, of Hyoscyamus niger, or Henbane; also the leaves separated from the branches, and flowering tops, carefully dried. Gathered when about two-thirds of the flowers are expanded, from the second year's herb, which is indigenous, growing wild, or cultivated in Britain.

Description. The leaves vary in length, being sometimes ten inches long; they are green in colour when fresh, sessile, exstipulate, oblong, acutely sinuous, woolly or hairy, and viscid. The fresh herb has a strong unpleasant odour, and a slightly acrid taste, which nearly disappears on drying. The fresh juice dropped into the eye dilates the pupil. The seeds are very small and brown, not official, but sometimes employed medicinally.

Prop. & Comp. All parts of the plant contain *Hyoscyamine*, a volatile alkaloid which is isomeric with atropine, but not identical with it; an acid, probably *malic*, and a volatile principle are also present.

Off. Prep. **Extractum Hyoscyami.** *Extract of Henbane.* (A green extract prepared from the juice of the fresh leaves, flowering tops, and young branches, as the other green extracts.)

Succus Hyoscyami. *Juice of Henbane.* (Seven pounds of the fresh leaves, flowering tops, and young branches are bruised in a mortar, and to every three measures of the juice one measure of rectified spirit is added.) To be kept in a cool place.

Tinctura Hyoscyami. *Tincture of Henbane.* (Henbane leaves, or flowering tops, in coarse powder, two and a half ounces; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Extract of henbane is contained in pilula colocynthidis et hyoscyami.

Therapeutics. Henbane appears to act as belladonna and stramonium, but is much milder, and is used chiefly as a sedative in certain excited conditions of the nervous system when opium is not advisable; it is also employed to diminish pain and allay irritation of the bladder, to prevent the griping of purgative medicines, ease cough, and diminish spasm in very many diseases. It, as well as stramonium, may be used to dilate the pupil in place of belladonna. Henbane has been stated to differ from belladonna in being directly sedative in its action upon the heart, but it would be desirable to obtain the results of comparative trials on the same patient. The author has found that henbane, when internally administered in large doses, causes the same symptoms as belladonna and stramonium; namely, dilatation of the pupil and presbyopia, dryness of the mouth and fauces, delirium, eruption on the skin, and loss of power over the bladder in cases of slight paraplegia.

Dose. Of the extract, 5 gr. to 10 gr., or more; of the tincture, 30 min. to 1 fl. drm., or upwards; of the juice, 30 min. to 1 fl. drm.

Incompatibles. Caustic fixed alkalies, as potash or soda, when in contact with the preparations of henbane, destroy their activity by causing the decomposition of the active principle contained in them. (See Belladonna.)

TABACI FOLIA. Leaf Tobacco. The dried leaves of Nicotiana Tabacum; Virginian Tobacco; growing chiefly in tropical America.

Description. The leaves are large, being sometimes more than twenty inches long, ovate, or oblong, lanceolate acuminate, with numerous short glandular hairs; odour slight when fresh, but becoming heavy or narcotic in drying; taste bitter and somewhat acrid: pale green when fresh, mottled-brown when dry. Official tobacco is not manufactured.

Prop. & Comp. Tobacco leaves when distilled with caustic potash yield a liquid alkaloid, having a peculiar odour, *Nicotine* ($C_{10}H_{14}N_2$); when pure, it occurs as a colourless oil, but becomes yellow by exposure; sp. gr. 1·027; volatilises at 480° F. (248°·9 C.). It is soluble in water, alcohol, and ether; it neutralises acids, but the salts are difficult to crystallise; its solution gives rise to a precipitate with perchloride of platinum and tincture of galls. Nicotine is very poisonous, and is contained in tobacco smoke; when given internally it is stated to dilate the pupils. Virginian tobacco contains about 6 to 7 per cent. of the alkaloid. The acid of the plant is probably malic acid. A volatile oil, named *Nicotianin,* is also present.

Therapeutics. Tobacco, when internally administered, acts as a powerful sedative, especially affecting the heart; it frequently causes diuresis, and has been used in dropsy. It is, however, seldom employed as an internal remedy, on account of the dangerous depression sometimes induced. An enema of tobacco was formerly occasionally prescribed (although seldom since the introduction of chloroform), in strangulated hernia, &c., to produce great muscular relaxation. Externally, tobacco acts as a powerful irritant, and is occasionally ordered medicinally in the form of snuff, as an errhine in head affections, &c.; also in the form of smoke, as a sedative and expectorant in some varieties of asthma; its employment after breakfast is often stated to relieve chronic constipation. The frequent use of tobacco in the form of snuff, or of cigars, &c., influences much the susceptibility of individuals to this drug; a dose which may prove extremely depressing to one, may scarcely affect another person; for by use a tolerance of the drug is established, as in the case of opium.

SCROPHULARIACEÆ.

DIGITALIS FOLIA. Foxglove Leaves. The dried leaf of Digitalis purpurea, or Purple Foxglove; collected from wild indigenous plants, when about two-thirds of the flowers are expanded.

Description. The leaf is from four to twelve or more inches in length, and sometimes as much as five or six inches broad, with a winged petiole of varying length; it is ovate, lanceolate, or oblong; crenate, rugose, and downy, more especially on the under surface, which is veined; of a dull green colour above, paler beneath.

Prop. & Comp. Foxglove leaves have a faint, agreeable, tea-like odour; their taste is somewhat bitter and acrid. At least five principles are said to be present in foxglove leaves, viz., *digitoxin*, *digitalin*, *digitaleïn*, *digitonin*, and *digitin*. They are all non-nitrogenous and, with the exception of digitoxin, they are all glucosides. The first three are cardiac poisons. *Digitonin* has an action like that of saponin, being a powerful irritant, a local anæsthetic, and a muscular poison; *digitin* appears to be inert. *Digitoxin* and *digitalin* are insoluble in water, while *digitaleïn* is readily soluble.

Off. Prep. Of Digitalis. **Infusum Digitalis.** *Infusion of Foxglove.* (Dried foxglove leaves, twenty-eight grains; boiling distilled water, ten fluid ounces.)

Tinctura Digitalis. *Tincture of Foxglove.* (Foxglove leaves, dried, two and a half ounces; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Small doses of digitalis induce contraction of the systemic arterioles and raise the blood-pressure in the arteries; the heart contracts more slowly and powerfully, owing partly to the increased pressure with which it has to contend. In poisonous doses, the drug causes quick and irregular action of the heart by directly influencing its nervous apparatus, together with a relaxation of the capillary system and a fall of blood-pressure. Finally the heart stops beating with its ventricles firmly contracted.

When administered to a patient, the most marked effect produced by the drug is slowing of the pulse; some observers assert that this is preceded by a transient quickening. If the dose be increased, alarming symptoms may arise, such as nausea, vomiting, purging, faintness, and syncope; this is especially apt to occur when the patient attempts to make any exertion, even to sit or stand up; in fact, patients under the full influence of digitalis, which is sometimes purposely induced, are only safe when in a horizontal posture.

Digitalis is given as a cardiac sedative in almost all cases where there is excited action, whether it be of sympathetic origin, or due to organic disease of the heart or great vessels, as hypertrophy, valvular disease, aneurism, &c. It is perhaps most useful in cases of mitral disease with dilated heart, very irregular pulse, and low arterial tension; it is least serviceable, sometimes even hurtful, in aortic disease with full compensatory hypertrophy. It should be given with caution when the vascular system is generally atheromatous, and the muscular tissue of the heart fatty.

Digitalis is also employed as a diuretic, more especially when the deficient flow of urine is due to heart-disease, and associated with dropsy; in such cases, it frequently causes a greatly increased secretion of water, and a rapid removal of the œdema. When the dropsy is associated with normal or exalted blood-pressure, digitalis is not a suitable remedy. It should not be used in the dropsy of chronic Bright's disease.

Digitalis occasionally acts as a sedative and soporific; but only when the restlessness and insomnia are due to an over-excited state of the heart.

It has been largely used in acute inflammatory disorders such as pneumonia and erysipelas; also in enteric fever, acute rheumatism, &c. It reduces the pulse and temperature, but without affecting the course of the disease.

Digitalis is of value in the treatment of hæmorrhage, especially from the lungs. It has been recommended in phthisis, but it is not productive of any permanent benefit in this disease; sometimes it does positive harm.

Digitalis has also been used as a remedy in delirium tremens and acute mania. The author has certainly seen many cases of delirium tremens rapidly recover under its influence, sleep being speedily produced; but the doses administered have been very large, from 2 to 4 fluid drachms of the tincture, repeated every four hours for three times only. He has also seen well-marked good arise from giving 30 min. doses every 2 or 4 hours until sleep is induced.

Digitalis is commonly said to have a *cumulative* action; by this we understand that during its continued use, alarming symptoms may arise suddenly, and without any previous increase of dose to account for them. The true explanation of the phenomenon appears to be this : the physiological effect of the drug depends on the amount present in the blood at any given time ; and this depends on two factors—the rate of its absorption, and the rate of its elimination. If the dose be augmented, elimination remaining constant, dangerous symptoms will arise. A moment's reflection will show that a similar explosive effect may be produced by any check to the process of elimination (and a very trifling cause may suffice to do this), the dose and interval of administration remaining unaltered. Hence the caution with which digitalis should be administered in cases where the renal functions are interfered with, *e.g.*, in chronic Bright's disease.

Dr. Lauder Brunton and Dr. Cash have recently made some experiments which appear to show that a high temperature lessens the inhibitory power of the vagus centre in the medulla to such an extent that digitalis, and probably all drugs which act like digitalis on this centre, lose, to a great degree, their power to restrain the action of the heart and slow the pulse. The administration of digitalis to patients in a febrile condition, is therefore likely to have much less effect on the pulse than at the normal temperature ; if the temperature is very high it may have no effect at all while this persists. When the temperature begins to fall, the pulse naturally becomes slower, and this slowness is increased if digitalis has been given. It is therefore evident that digitalis should be employed with great care when the temperature is high, so as to avoid producing a too great depression of the pulse during defervescence.

Dose. Of the powdered leaves, ½ gr. to 1½ gr. ; of infusion, 2 fl. drm. to 4 fl. drm. or more ; of tincture, 5 min. to 30 min. and upwards.

Adulteration. Foxglove leaves are occasionally found mixed with those of *Verbascum thapsus* and other plants. Attention to the characters of the true leaf, given above, will readily distinguish the admixture.

LABIATÆ.

OLEUM ROSMARINI. Oil of Rosemary. The oil distilled in Britain from the flowering tops of Rosmarinus officinalis, or rosemary ; growing chiefly on the hills in the Southern countries of Europe.

Prop. & Comp. This oil, which has the fragrant odour and taste of the plant, is colourless, and of sp. gr. 0·888. It is an oxidised oil, or a hydrocarbon ($C_{10}H_{16}$) containing a species of camphor ($C_{10}H_{16}O$) in solution.

Off. Prep. **Spiritus Rosmarini.** *Spirit of Rosemary.* (Oil of rosemary, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

The oil of rosemary is contained also in tinctura lavandulæ composita and linimentum saponis.

Therapeutics. A powerful stimulant; useful in hysteria, and nervous headaches; externally, it is used as a rubefacient and for its odour.

Dose. Of the oil, 1 min. to 4 min.; of the spirit, ½ fl. drm. to 1 fl. drm.

OLEUM LAVANDULÆ. Oil of Lavender. The oil distilled in Britain from the flower of Lavandula vera, or Common Lavender; a native of Southern Europe; much cultivated in gardens in Surrey. Oil of Spike (French Lavender) is often used in lieu of the British oil.

Prop. & Comp. Oil of Lavender, which gives the odour and taste to the plant, is either colourless or of a pale yellow colour, and has a hot bitter aromatic taste. Sp. gr. 0·877. It is an oxidised volatile oil or a hydrocarbon ($C_{10}H_{16}$) containing a camphor ($C_{10}H_{16}O$) dissolved in it.

Off. Prep. **Spiritus Lavandulæ.** *Spirit of Lavender.* (Oil of lavender, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

Tinctura Lavandulæ Composita. *Compound Tincture of Lavender.* (Oil of lavender, one fluid drachm and a half; oil of rosemary, ten minims; cinnamon and nutmeg, bruised, each one hundred and fifty grains; red sandalwood, three hundred grains; rectified spirit, forty fluid ounces. Prepared by maceration.)

Oil of lavender is also contained in linimentum camphoræ compositum.
The tincture is contained in liquor arsenicalis.

Therapeutics. Oil of lavender is stimulant and carminative: it is used in hysteria, hypochondriasis, and other nervous affections, also in flatulence and colic.

Dose. Of the oil, 1 min. to 4 min.; of spirit of lavender, ½ fl. drm. to 1 fl. drm.; of the compound tincture, ½ fl. drm. to 2 fl. drm.

Adulteration. Oil of spike is sometimes mixed with or substituted for the true oil of lavender; oil of turpentine is also mixed with it.

MENTHÆ PIPERITÆ OLEUM. Oil of Peppermint. The oil distilled in Britain from the fresh flowering plant of Mentha Piperita, Peppermint; indigenous, growing in damp places.

Prop. & Comp. The peppermint plant owes its virtue to the presence of the *volatile oil*, which is colourless, greenish-yellow, or pale yellow, when fresh, gradually becoming thicker and reddish by age, having the odour of peppermint, with a warm aromatic taste, succeeded by a sensation of coldness in the mouth. Sp. gr. 0·92. When kept for some time at a low temperature, menthylic alcohol, menthol, ($C_{10}H_{20}O$), or peppermint camphor is deposited from it.

Off. Prep. **Aqua Menthæ Piperitæ.** *Peppermint Water.* (Oil of peppermint, one fluid drachm and a half; water, one gallon and a half; distil one gallon.)

Essentia Menthæ Piperitæ. *Essence of Peppermint.* (Oil of peppermint, a fluid ounce; rectified spirit, four fluid ounces.)

Spiritus Menthæ Piperitæ. *Spirit of Peppermint.* (Oil of peppermint, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

The oil is also contained in pilula rhei composita, and in tinctura chloroformi et morphinæ.

Therapeutics. Oil of peppermint is stimulant and carminative; used as an adjunct to purgatives, to correct flatulency, &c.

Dose. Of the oil, 1 min. to 4 min.; of peppermint water, 1 fl. oz. to 2 fl. oz.; of the essence, 10 min. to 20 min.; of spirit of peppermint, ½ fl. drm. to 1 fl. drm.

MENTHOL. Menthol. $C_{10}H_{20}O$. A stearoptene obtained by cooling the oil distilled from the fresh herb of Mentha arvensis (DC.), vars. piperascens et glabra (Chinese Oil of Peppermint); and of Mentha piperita.

Prop. Menthol occurs in colourless acicular crystals, usually more or less moist from adhering oil; or in fused crystalline masses. It should melt at a temperature not above 110° F (43°·3 C.). It has the odour and flavour of peppermint, producing warmth on the tongue, or, if air is inhaled, a sensation of coolness. Sparingly soluble in water, freely in rectified spirit, the solutions having a neutral reaction. Boiled with sulphuric acid diluted with half its volume of water, menthol acquires a blue colour, the acid becoming brown. It should be entirely dissipated by the heat of a water-bath.

Therapeutics. Menthol is an antiseptic, but it is employed mainly as a local anæsthetic, especially in cases of facial neuralgia, sciatica, and pleurodynia. It may be used in the form of sticks to be gently rubbed over a painful part, or as an alcoholic solution. It has occasionally been given internally as a diffusible stimulant.

Dose. ½ gr. to 2 gr.

OLEUM MENTHÆ VIRIDIS. Oil of Spearmint. The oil distilled in Britain from the fresh herb when in flower of Mentha viridis, Spearmint; indigenous, growing in marshy places.

Prop. & Comp. The plant owes its virtues to the *volatile oil,* which is colourless, pale yellow, or greenish-yellow when recent, becoming reddish by age, with the odour and taste of spearmint, sp. gr. 0·914. It is an oxidised volatile oil or a hydrocarbon, containing a camphor in solution.

Off. Prep. **Aqua Menthæ Viridis.** *Spearmint Water.* (Oil of spearmint, one fluid drachm and a half; water, one gallon and a half. Distil one gallon.)

Therapeutics. Spearmint oil is stimulant and carminative; and is used as an adjunct to purgative medicines, to correct flatulency, &c.

Dose. Of the oil, 1 min. to 4 min.; of spearmint water, 1 fl. oz. to 2 fl. oz.

THYMOL. Thymol. $\mathbf{C_{10}H_{13}HO}$. A stearoptene obtained from the volatile oils of Thymus vulgaris, Garden Thyme; Monarda punctata, Horsemint; and Carum Ajowan.

Prep. By saponifying the oils with caustic soda and treating the separated soap with hydrochloric acid, or from a distilled fraction of the oil by exposure at a low temperature. It may be purified by recrystallisation from alcohol.

Prop. Thymol forms large oblique prismatic crystals having the odour of thyme, and a pungent aromatic flavour. They sink in cold water, but at a temperature of 110° to 125° F. (43°·3 to 51°·7 C.) they melt and rise to the surface. Slightly soluble in cold water, freely in alcohol, ether, and solutions of alkalies. The crystals volatilise completely at 212° F. (100° C.). A solution of thymol in half its bulk of glacial acetic acid, warmed with an equal volume of sulphuric acid, assumes a reddish-violet colour.

Therapeutics. Thymol is a powerful antiseptic, and is employed as a spray, or as an antiseptic dressing similar to carbolic gauze. It has been recommended in the treatment of ringworm, psoriasis, and eczema on account of its mild caustic action. It has also been administered in cases of diphtheria, and typhoid fever.

Dose. ½ gr. to 2 gr., given in alcoholic solution.

SCHOOL OF MEDICINE

SUB-CLASS IV. APETALÆ.

POLYGONACEÆ.

RHEI RADIX. Rhubarb Root. The root, more or less deprived of its bark, sliced and dried, of Rheum palmatum, (*Linn.*); Rheum officinale, (*Baillon*); and probably other species. Collected and prepared in China and Thibet. This definition includes the Russian, the East Indian, and the Dutch-trimmed or Batavian rhubarbs. Rhubarb is imported from Shanghai and Canton; it is no longer brought overland through Russia.

Description. *Russian* or so-called *Turkey* rhubarb occurs in trapezoid, irregularly shaped, flat, or cylindrical, angular pieces, the cortex having been removed by slicing; externally it is smooth and yellow and not turned brown by boric acid, showing absence of turmeric; the texture is compact; the fracture uneven, and marbled red and grey; the powder is bright buff-yellow, and the odour rather aromatic; taste astringent and disagreeable; it feels gritty, and tinges the saliva bright yellow; the pieces generally have a hole drilled in them which contains the remains of the cord used to suspend them to dry.

East Indian, or half-trimmed rhubarb, differs from the last in not being angular, but slightly rounded, with adhering portions of the cortex, as if it had been scraped and sliced; externally it is red and veined, not covered with yellow powder, as the Russian variety; also denser, with a smoother fracture, less gritty, and the powder of a redder hue.

Another variety is called *Dutch-trimmed* or *Batavian* rhubarb; in round or flattened pieces, angular, and drilled with a hole; probably of the same origin as the Russian.

Besides these varieties, others are met with, as the *Himalayan*, *Canton stick*, and *English* rhubarb. Some of the Himalayan, according to Dr. Royle, is yielded by *Rheum Emodi*, *Morecroftianum*, and *Webbianum;* the English variety is derived from *Rheum Rhaponticum*, and grows near Banbury.

Prop. & Comp. Rhubarb contains a principle, *Chrysophanic acid* ($C_{14}H_8O_4$), which occurs in crystalline needles of a golden yellow metallic lustre, sparingly soluble in water, freely so in alkaline solutions, with the formation of a reddish-brown colour ; it is soluble also in hot alcohol, ether, and benzene. A glucoside, *chrysophane*, is also present, capable of being split up into chrysophanic acid and sugar. Various resins have been obtained from rhubarb, one, phaoretin, having purgative properties. It also contains some astringent matter in the form of tannic and gallic acids. Rhubarb yields its active properties to boiling water, and also to alcohol. Crystals of oxalate of lime are found in it in considerable quantities, forming at times in the Russian variety, in which they are most numerous, as much as 35 per cent. of the drug.

Off. Prep. **Extractum Rhei.** *Extract of Rhubarb.* (Prepared by macerating one pound of rhubarb in three pints of proof spirit, percolating with water until five pints of liquor have been collected, and subsequently evaporating the solution to a pilular consistence.)

Infusum Rhei. *Infusion of Rhubarb.* (Sliced rhubarb, a quarter of an ounce; boiling distilled water, ten fluid ounces.)

Pilula Rhei Composita. *Compound Rhubarb Pill.* (Rhubarb, powdered, three ounces; socotrine aloes, powdered, two ounces and a quarter; myrrh, powdered, one ounce and a half; hard soap, one ounce and a half; oil of peppermint, one fluid drachm and a half; glycerine, one ounce; treacle, by weight, three ounces.)

Pulvis Rhei Compositus. *Compound Powder of Rhubarb.* (Gregory's powder.) (Rhubarb, two ounces; light magnesia, six ounces; ginger, one ounce.)

Syrupus Rhei. *Syrup of Rhubarb.* (Rhubarb root and coriander fruit, of each, two ounces; refined sugar, twenty-four ounces; rectified spirit, eight fluid ounces; distilled water, twenty-four fluid ounces.)

Tinctura Rhei. *Tincture of Rhubarb.* (Rhubarb, two ounces; cardamom seeds, a quarter of an ounce; coriander, a quarter of an ounce; saffron, a quarter of an ounce; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Vinum Rhei. *Wine of Rhubarb.* (Rhubarb, one ounce and a half; canella bark, sixty grains; sherry, a pint.)

Therapeutics. Rhubarb acts as a stomachic and slight astringent in small doses; as a purgative, in larger ones. Its purgative action is generally followed by constipation, dependent on its astringent constituents; it differs from many cathartics in not causing irritation of the alimentary canal. The urine becomes coloured by it, as also do the perspiration and the milk. In consequence of its purgative properties it is often used at the commencement of diarrhœa depending on the presence of irritant matter in the canal, which is thus expelled, and the subsequent astringent effect proves very valuable. It is frequently combined with magnesia, especially when given to children, as in Gregory's powder. In cases of atonic dyspepsia, attended with some constipation, it is a valuable remedial agent; but if prescribed in cases of habitual constipation, it should be combined with some other laxative. It is sometimes useful, combined with a mercurial alterative, for scrofulous children, aiding and giving tone to the digestive organs, &c. Externally it has been applied to indolent ulcers.

Dose. Of powdered rhubarb, 1 gr. to 5 gr. as a stomachic; 10 gr. to 30 gr. as a purgative; of the extract, 5 gr. to 15 gr.; of infusion, 1 fl. oz. to 2 fl. oz.; of the syrup, 1 fl. drm. to 4 fl. drm.; of the tincture, as a stomachic, 1 fl. drm. to 2 fl. drm.; as a purgative, ½ fl. oz. to 1 fl. oz.; of compound rhubarb pill, 5 gr. to 10 gr.; of the compound powder, 5 gr. to 10 gr. for children, for an adult, 20 gr. to 60 gr.; of the wine, 1 fl. drm. to 2 fl. drm.

Adulterations. Rhubarb is very often extensively adulterated. Inferior varieties of rhubarb, as the English, are substituted for the Russian, &c. If turmeric is present, it is reddened by boric acid, which has no such effect upon the colouring matter of rhubarb. In English rhubarb, starch is generally in excess, oxalate of calcium in small amounts only; the proportions of these ingredients are reversed in the Chinese varieties.

MYRISTICACEÆ.

MYRISTICA. Nutmeg. The dried seed of Myristica fragrans (Myristica officinalis, *Linn.*), divested of its hard coat or shell. Cultivated extensively in the Banda Islands of the Malayan Archipelago.

OLEUM MYRISTICÆ EXPRESSUM. Expressed Oil of Nutmeg. A concrete oil obtained from nutmegs by expression and heat.

OLEUM MYRISTICÆ. Volatile Oil of Nutmeg. The oil distilled in Britain from nutmeg.

Description. The *nutmeg* is of a spheroidal shape, resembling that of a small bird's egg, about an inch in length, externally marked with reticulated furrows, greyish-red internally, with dark brownish veins; it has a strong and pleasantly aromatic odour and a bitter aromatic taste. It consists of the albumen of the seed; the inflexions of the reddish-brown inner coat give the cut surface a mottled appearance, and contain the oil. The *concrete oil*, or fat, is of a firm consistence, an orange colour, and has the odour of nutmeg. The *volatile oil*, obtained by distillation, is colourless, or of a straw yellow colour, with the odour and taste of nutmeg.

Prop. & Comp. By expression nutmegs yield about 30 per cent. of the concrete oil, which is soluble in four times its weight of boiling alcohol, and in half that quantity of ether; the concrete oil consists of a *fixed oil* or *fat*, united with a *volatile oil*, the latter has sp. gr. 0·95, and is the same as that obtained by distillation. The fixed fat yields a peculiar acid, myristic acid ($C_{14}H_{28}O_2$), crystallising in silky needles. Nutmeg contains, besides these principles, woody fibre, and the ordinary constituents of seeds.

Off. Prep.—Of Nutmeg. Nutmeg is one of the ingredients of pulvis catechu compositus, pulvis cretæ aromaticus, spiritus armoraciæ compositus, and tinctura lavandulæ composita.

Of the Concrete Oil. This is used in the preparation of emplastrum calefaciens and emplastrum picis.

Of the Volatile Oil. **Spiritus Myristicæ.** *Spirit of Nutmeg.* (Volatile oil of nutmeg, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

Spirit of nutmeg occurs in mistura ferri composita.

Volatile oil of nutmeg also forms one of the ingredients of pilula aloes socotrinæ and spiritus ammoniæ aromaticus.

Therapeutics. Nutmeg is an aromatic and gentle stimulant, and carminative; in large doses it is said to possess well marked narcotic properties, causing drowsiness, and even complete stupor and insensibility. It is perhaps more frequently used for giving flavour to farinaceous and other articles of food, than for its medicinal properties. Applied externally, the expresed oil of nutmeg acts as a topical stimulant, and has been used in chronic rheumatism, and to add to the effect of other stimulants in the warming and pitch plasters, &c.

Dose. Of nutmeg in powder, 5 gr. to 15 gr.; of the volatile oil, 1 min. to 4 min.; of the spirit of nutmeg, 30 min. to 60 min

LAURACEÆ.

CINNAMOMI CORTEX. Cinnamon Bark. The dried inner bark of shoots from the truncated stocks of Cinnamomum Zeylanicum, imported from Ceylon, and distinguished in commerce as Ceylon cinnamon.

OLEUM CINNAMOMI. Oil of Cinnamon. The oil distilled from cinnamon bark.

Description. Cinnamon bark is about ⅛th of a line in thickness, in closely-rolled quills, which are about three-eighths of an inch in diameter, containing several small quills within them; the colour is a characteristic yellowish-brown externally: darker brown on the inner surface; it is brittle, and breaks with a splintery fracture; it has an aromatic odour, and warm aromatic taste. The *oil* is of a bright yellow colour, with the odour and taste of the bark, but it gradually becomes red; it is heavier than water.

Prop. & Comp. The bark owes its important properties to the *oil*, but besides this oil, *tannic acid* is present in notable quantities, also *resin*, and *cinnamic acid*, &c. The essential part of oil of cinnamon has a composition represented by the formula (C_9H_8O), cinnamic aldehyde, or hydride of cinnamyl; but there is likewise a hydrocarbon ($C_{10}H_{16}$) in small amount. Hydride of cinnamyl, when exposed to the air, gradually absorbs oxygen with the formation of cinnamic acid and a resin; both of which products, as above stated, are found in the bark.

Off. Prep.—Of the Bark. **Aqua Cinnamomi.** *Cinnamon Water.* (Cinnamon bark, bruised, twenty ounces; water, two gallons. Distil one gallon.)

Used in the preparation of mistura cretæ, mistura guaiaci, and mistura spiritus vini gallici.

Pulvis Cinnamomi Compositus. *Compound Powder of Cinnamon.* (Cinnamon bark in powder; cardamom seeds in powder, ginger in powder, of each one ounce.)

Tinctura Cinnamomi. *Tincture of Cinnamon.* (Cinnamon bark, in coarse powder, two ounces and a half; rectified spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Cinnamon bark is also contained in the compound tincture of cardamoms, the compound tincture of lavender, in tincture of catechu, infusion of catechu, and other preparations.

Of the Oil. **Spiritus Cinnamomi.** *Spirit of Cinnamon.* (Oil of cinnamon, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

Employed in the preparation of aromatic sulphuric acid.

Therapeutics. Cinnamon is a stimulant, aromatic, and carminative, also somewhat astringent; useful as an adjunct in diarrhœa. The oil may be employed in flatulence, and may be added to purgatives.

Dose. Of the powdered bark, 10 gr. to 30 gr.; of cinnamon water, 1 fl. oz. to 2 fl. oz.; of the tincture, ½ fl. drm. to 2 fl. drm.; of the oil of cinnamon, 1 min. to 4 min.; of the spirit of cinnamon, ½ fl. drm. to 1 fl. drm.

Adulteration. The bark called Cassia, or Chinese Cinnamon (from Cinnamomum Cassiæ), is detected by its greater thickness and roughness, and less aromatic odour and taste.

CAMPHORA. Camphor. A stearoptene obtained from the wood of Cinnamomum Camphora (Camphora officinarum). Imported in the crude state from China and Japan, and purified in Britain by sublimation.

Description. Camphor is usually sublimed in the form of hollow hemispherical cakes, and these are broken into smaller masses, which are crystalline, white, semitransparent and tough, and present numerous fissures in the larger pieces, with a powerful, penetrating odour and a pungent bitter taste, followed by a sensation of cold. Crude camphor, as imported, is in the form of small crystalline grains, of a dirty white colour; this is mixed with lime before it is sublimed.

Prop. & Comp. Camphor is rather tough and difficult to pulverise, except when a few drops of spirit are added: sp. gr. 0·98. It is soluble in alcohol, ether, and chloroform; sparingly so in water, yet sufficient is taken up to give a strong taste and odour to that liquid; it sublimes entirely when heated. It has the nature of a concrete volatile oil, and its formula is ($C_{10}H_{16}O$).

Off. Prep. **Aqua Camphoræ.** *Camphor Water.*

Synonym. Mistura Camphoræ. (Camphor, broken into pieces, half an ounce; distilled water, one gallon. Enclose the camphor in a muslin bag, and attach this to a piece of glass, by means of which it may be kept at the bottom of a bottle containing the distilled water. Close the mouth of the bottle, macerate for at least two days, and then pour off the solution when it is required.) It is said to contain about half a grain of camphor to the ounce.

Linimentum Camphoræ. *Camphor Liniment.* (Camphor, one ounce; olive oil, four fluid ounces.) Camphorated oil

Linimentum Camphoræ Compositum. *Compound Liniment of Camphor.* (Camphor, two ounces and a half; oil of lavender, one fluid drachm; strong solution of ammonia, five fluid ounces; rectified spirit, fifteen fluid ounces.)

Spiritus Camphoræ. *Spirit of Camphor.* (Camphor, one ounce; rectified spirit, nine fluid ounces.)

Tinctura Camphoræ Composita. *Compound Tincture of Camphor.* (Opium, in coarse powder, forty grains; benzoic acid, forty grains; camphor, thirty grains; oil of anise, half a fluid drachm; proof spirit, twenty fluid ounces.)

Each fluid drachm contains the soluble matter of a quarter of a grain of opium.

Camphor is also contained in many other official preparations, as in several of the liniments and one of the ointments.

Therapeutics. Camphor is a poison to the lowest forms of animal and vegetable life; it possesses antiseptic properties and arrests protoplasmic movement; it lowers the pulse and temperature in septicæmic fever. (Cf. EUCALYPTUS.) Upon insects and many animals it acts as a narcotic poison. It is a powerful irritant to raw surfaces and mucous membranes (when applied in substance).

Administered to the human subject in very large doses (30 gr. to 80 gr.), camphor has been known to cause dangerous symptoms—vertigo, sickness, muscular weakness, coldness of extremities, feeble pulse, loss of consciousness, and even death. In medicinal doses, it acts as a stimulant and antispasmodic; it appears also to possess some antipyretic power. It has been employed in adynamic fevers and choleraic diarrhœa; in various spasmodic affections, such as whooping-cough, chorea, and epilepsy; in the various forms of hysteria; in chordee; as a calmative in psychical disorders, especially when connected with sexual excitement. Externally, it is used as a stimulant to stiff and painful parts. Camphor inhalations have been recommended for coryza.

Dose. Of camphor, 1 gr. to 10 gr.; of camphor water, 1 fl. oz. to 2 fl. oz.; of the spirit, 10 min. to 30 min., suspended in water (which precipitates it) by means of mucilage; of the compound tincture of camphor, 15 min. to 1 fl. drm., the dose depending on the amount of opium rather than on the camphor contained in it.

Adulteration. Camphor is not often adulterated, but another kind, called Borneo Camphor, from Dryobalanops camphora, a guttiferous plant, is sometimes met with; heavier than water, less volatile, and more opaque than true camphor. An artificial camphor can be made by passing hydrochloric acid gas through volatile oil of turpentine.

SASSAFRAS RADIX. Sassafras. The dried root, reduced to chips or shavings, of Sassafras officinale, or Sassafras Tree; growing in the United States and Canada.

Description. In large branched pieces, sometimes eight inches in diameter at the crown; the wood, light and spongy, of a pale greyish-brown colour; the bark, dark reddish-brown, also spongy. Odour agreeable; taste warm, sweet, and aromatic. The medicinal properties of the bark are more powerful than those of the wood; it is official in the form of chips or shavings.

Prop. & Comp. Sassafras root contains a *volatile oil*, *resin*, and a principle called *sassafrin*, with a little tannin, &c.

Off. Prep. It is contained in decoctum sarsæ compositum.

Therapeutics. A stimulant and diaphoretic, seldom given alone; used in chronic rheumatism, skin diseases, and syphilis. The volatile oil, Oleum Sassafras, may be employed.

Dose. Of the oil, 1 min. to 4 min.

NECTANDRÆ CORTEX. Bebeeru Bark. The Bark of Nectandra Rodiæi, the Green-heart Tree. Imported from British Guiana.

BEBERINÆ SULPHAS. Sulphate of Beberine. It is prepared from Nectandra or Bebeeru bark, and is probably a mixture of sulphates of beberine, ($C_{36}H_{42}N_2O_6$), nectandrine ($C_{40}H_{46}N_2O_8$), and other alkaloids.

Description. The bark is found in large flat pieces, from one to two feet long, from two to six inches broad, and about a quarter of an inch thick, heavy, hard, and fibrous; of a greyish-brown colour externally, reddish or cinnamon-brown within; taste very bitter, with much astringency.

Prep. of Sulphate of Beberine. Sulphate of beberine is prepared by exhausting the powdered bark by maceration and percolation with water, strongly acidulated with sulphuric acid. The colouring and other matters, and the excess of sulphuric acid, are then precipitated from this solution after concentration, by mixing it with milk of lime (not sufficient to render the fluid alkaline), and the deposit is separated by filtration. To the filtered solution, containing the beberine in the form of sulphate, ammonia is added until the fluid has a faint ammoniacal odour; the precipitate of impure beberine which forms is collected on a cloth, squeezed and dried in a vapour bath. It is powdered and exhausted by repeated boiling with rectified spirit, which dissolves the alkaloid, and to the solution water is added, and the spirit recovered by distillation; the residue is treated with dilute sulphuric acid, till the fluid becomes slightly acid, by which means the alkaloid is converted into a sulphate; the solution is then evaporated to dryness on a water-bath, the product pulverised and the powder treated with cold water, which dissolves the sulphate of beberine; the filtered solution is evaporated to a syrupy consistence, and spread in thin layers on flat porcelain or glass plates, and dried at a heat not exceeding 140° F. (60° C.). It should be preserved in stoppered bottles.

Prop. & Comp. Bebeeru bark contains an alkaloid, not yet crystallised, Beberine ($C_{36}H_{42}N_2O_6$), a yellow resinous-looking body, possibly a mixture of several principles; soluble in alcohol, slightly in ether, scarcely in water; it forms salts with acids; the commercial and official salt is the impure sulphate, which occurs in dark brown, thin, translucent scales, yellow when powdered, with a strong bitter taste, soluble in water, yielding a clear brown solution, and also soluble in alcohol. Its watery solution gives a white precipitate with chloride of barium, and with caustic soda a yellowish-white precipitate, which is dissolved by agitating the mixture with twice its volume of ether. The ethereal solution separated by a pipette and evaporated, leaves a yellow translucent residue, entirely soluble in dilute acids. It leaves no ash when burnt.

Therapeutics. The bark is seldom given; the sulphate of beberine was introduced into medicine as a substitute for quinine, and it was stated to be both tonic and antiperiodic. It resembles the cinchona alkaloids in antiseptic power, preventing the development of bacteria even when used in very minute proportions; it also resembles them in exerting an inhibitory influence upon the migratory movements of the colourless blood-corpuscles. The author has made several observations upon its action in typical cases of ague, but he never succeeded in curing a case, although he increased the dose of sulphate of beberine until it caused disturbance of the stomach; the same cases yielded immediately to the influence of quinine. It is now stated to be useful in periodic headaches. Beberine may act as a tonic, but it is an imperfect substitute for quinine.

Dose. Of the sulphate of beberine, 1 gr. to 10 gr.

ARISTOLOCHIÆ.

SERPENTARIÆ RHIZOMA. Serpentary Rhizome. The dried rhizome and rootlets of Aristolochia Serpentaria, Serpentary, or Virginian Snakeroot, or of Aristolochia reticulata; grown in Virginia and other parts of the United States.

Description. A twisted rhizome, about one inch long and an eighth of an inch in diameter, with a tuft of numerous rootlets about three inches long, of a pale greyish-brown colour; the root has an aromatic and camphoraceous odour, and bitter camphoraceous taste.

The rhizome and rootlets of Aristolochia reticulata agree essentially with the above, but the rhizome is a little thicker, and the rootlets longer, coarser, and less matted together.

Prop. & Comp. Serpentary contains a *volatile oil* and *resin;* also a *bitter extractive* matter; the latter soluble in water, the former in spirit.

Off. Prep. **Infusum Serpentariæ.** *Infusion of Serpentary.* (Serpentary rhizome, a quarter of an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Serpentariæ. *Tincture of Serpentary.* (Serpentary rhizome, in fine powder, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Serpentary is also contained in tinctura cinchonæ composita.

Therapeutics. A stimulant and tonic: also diaphoretic and diuretic. It is sometimes used in atonic dyspepsia, chronic rheumatism, in low febrile states, and to promote eruption in the exanthemata. The author, from observations made during many years, is inclined to think that serpentary is a remedy of some considerable power, acting in a manner not unlike guaiacum, in stimulating the capillary circulation, and promoting recovery in chronic forms of gouty inflammation; as it does not disturb the bowels, it may often be administered when guaiacum is not easily tolerated.

Dose. Of the powdered root, if ever administered, 10 gr. to 20 gr. or more; of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture ½ fl. drm. to 2 fl. drm.

THYMELACEÆ.

MEZEREI CORTEX. Mezereon Bark. The dried bark of Daphne Mezereum, or Mezereon; or of Daphne Laureola, the Spurge Laurel. The latter is chiefly found in commerce; indigenous.

Description. In long, thin, more or less flattened strips, which are commonly folded or rolled into disks, or in small quills; tough, of a brown colour outside, but white and fibrous within, with slight odour, taste hot and very acrid.

Prop. and Comp. An *acrid volatile oil*, *acrid resin*, and a crystalline principle, *daphnin.* When the root is boiled in water, an acrid vapour rises.

Off. Prep. **Extractum Mezerei Æthereum.** *Ethereal Extract of Mezereon.* (Mezereon bark, a pound; rectified spirit, eight pints; ether, a pint. Prepared by maceration in the spirit, evaporation to form a spirit extract, then taking up with the ether and evaporating again to the consistence of a soft extract.)

This extract is contained in linimentum sinapis compositum.

Mezereon bark is contained in decoctum sarsæ compositum.

Therapeutics. Mezereon is a powerful local irritant, and even vesicant; it causes vomiting and purging in large doses, but in small ones, diaphoresis and diuresis. Used in chronic rheumatism, syphilis, scrofulous and skin diseases. Seldom given internally in this country, except in the compound decoction of sarsaparilla; now employed as an external irritant in combination with mustard in the compound mustard liniment. In America an ointment is used.

EUPHORBIACEÆ.

CASCARILLÆ CORTEX. Cascarilla Bark. The dried bark of Croton Eluteria, or Cascarilla Bush; growing in the Bahamas.

Description. In small quilled pieces from 2 to 4 inches long, and from one-sixth to half an inch in diameter; about the size of a pencil, fissured in both directions, of a dull brown colour, but spotted white with crustaceous lichens; fracture short, brown and resinous; sometimes it occurs in small flattened pieces without lichens.

Prop. and Comp. Odour spicy and pleasant, taste bitter and aromatic, its properties are yielded to water and spirit. It emits a fragrant odour when burned. The bark contains a bitter matter, in which a crystalline substance, *Cascarillin,* has been stated to exist; besides which, there are present some tannic acid, colouring matter, and a *volatile oil.*

Off. Prep. **Infusum Cascarillæ.** *Infusion of Cascarilla.* (Cascarilla bark, in coarse powder, one ounce; boiling distilled water, ten fluid ounces.)

Tinctura Cascarillæ. *Tincture of Cascarilla.* (Cascarilla bark, in fine powder, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Cascarilla is an aromatic stomachic and tonic, and probably a stimulant expectorant; useful in atonic dyspepsia, and in recovery from acute diseases; also in some forms of chronic bronchitis, in which the expectoration is very excessive. Cascarilla once enjoyed the reputation of possessing antiperiodic powers; but if it has any, it is much less powerful than Cinchona, and is now seldom employed in intermittent diseases.

Doses. Of powdered bark, 10 gr. to 30 gr.; of the infusion, 1 fl. oz. to 2 fl. oz.; of the tincture, ½ fl. drm. to 2 fl. drm.

OLEUM CROTONIS. Croton Oil. The oil expressed in Britain from the seed of Croton Tiglium; growing in the East Indies.

Description. The oil is slightly viscid, from brownish-yellow to dark reddish-brown in colour, of a disagreeable odour and acrid taste. The seeds from which the oil is expressed are smaller and duller in appearance, but otherwise much resemble castor oil seeds. The kernels yield from 50 to 60 per cent. of oil.

Prop. & Comp. Croton oil contains a volatile oily acid, *Crotonic acid* (not active), and a fixed oil. It is soluble in ether and volatile oils. The best croton oil is expressed from the seeds in Britain, and such oil is entirely soluble in an equal bulk of alcohol, without the aid of heat, and the mixture does not separate unless much cooled; the oil expressed in India, on the other hand, requires the aid of heat to dissolve it in alcohol, and the mixture soon separates into an alcoholic and an oily layer when allowed to cool.

Off. Prep. **Linimentum Crotonis.** *Liniment of Croton Oil.* (Croton oil, a fluid ounce; oil of cajuput and rectified spirit, of each three and a half fluid ounces.)

Therapeutics. A most powerful irritant, drastic purgative, often causing nausea and vomiting; used in obstinate constipation and in cerebral affections, as apoplexy; also in very minute quantities as an ordinary purgative. The author has frequently added a very small quantity of croton oil to castor oil, from one to four minims of the former, to four fluid ounces of the latter oil; by this means the acridity of the croton oil is greatly diminished, and the activity of the castor oil much increased.

Externally croton oil gives rise to pustulation, and diluted with olive oil or soap liniment, is a valuable counter-irritant.

Dose. Of the oil, ⅓ min. to 1 min., placed on the tongue; or formed into a pill with crumb of bread. As an adjunct, $\frac{1}{12}$ min. upwards.

Adulteration. Other fixed oils, as castor oil, might be added, which would be difficult to detect.

OLEUM RICINI. Castor Oil. The oil expressed from the seed of Ricinus Communis, the Castor Oil plant; growing in the East Indies and America; imported chiefly from Calcutta.

Description. The oil is thick, viscid, colourless, or of a pale straw-yellow, of slightly nauseous odour, and mild acrid taste. The seeds, about the size of small beans, are oval, compressed, obtuse at the ends, smooth and shining on the surface, of a light ash colour, marbled with dark spots and veins.

Prop. & Comp. Castor oil differs from most other fixed oils in being entirely soluble in one volume of alcohol and two volumes of rectified spirit; sp. gr. 0·96; it contains three oily acids, *Ricinic, Ricin-oleic,* and *Ricin-stearic,* united with *Glycerine.* It also contains some acrid resinous matter. When expressed without the aid of heat, it is called cold-drawn castor oil.

Use. Castor oil is used in preparing flexible collodion, compound liniment of mustard, and compound calomel pill.

Therapeutics. A mild, yet quick purgative medicine; causing little or no disturbance of the system; little more than the evacuation of the contents of the bowels. Used in delicate subjects, and in irritable conditions of the alimentary canal and neighbouring parts: as in gastritis, enteritis, dysentery, cystitis, &c. The seeds are very active, even dangerous.

Dose. 1 fl. drm. to 1 fl. oz.; often given floating on some liquid; sometimes in gelatine or membranous capsules; or in the form of an emulsion with some aromatic.

Adulteration. Other fixed oils difficult to detect, for mixed with castor oil, they are rendered to some extent, soluble in alcohol.

KAMALA. Kamala. Wurrus. The powder, consisting of minute glands and hairs obtained from the surface of the fruits of Mallotus philippinensis (Rottlera tinctoria). Imported from India.

Prop. & Comp. An orange-red, or brick-red granular powder, nearly tasteless and inodorous, scarcely mixing with water, but for the most part soluble in alcohol and ether, forming a red-coloured solution. Examined microscopically, it is seen to consist of irregular, spherical, flattened or depressed, garnet-red glands with wavy surfaces, mixed with nearly colourless, thick-walled, stellate hairs. Contains 80 per cent. of *resin,* soluble in alcohol and ether, with traces of *tannic acid, gum,* and *volatile oil.* It should be free from sand or earthy matter.

Therapeutics. A powerful anthelmintic, found very efficacious in India in the treatment of tape-worm. It usually purges freely. The author has employed it with success in some cases of tape-worm, but he has found its active purgative properties at times rather objectionable.

Dose. 30 gr. to ¼ oz. in honey or thick gruel.

SANTALACEÆ.

OLEUM SANTALI. Oil of Sandal Wood. The oil distilled from the wood of Santalum Album. A native of India.

Synonym. Oleum Santali Flavi.

Description & Prop. The oil is thick in consistency, of a pale yellow colour, with strongly aromatic odour, and pungent spicy taste. Sp. gr. about 0·96. Neutral or slightly acid in reaction; readily soluble in alcohol.

Therapeutics. Oil of sandal wood acts internally as a stimulant to involuntary muscular tissue, and as a remote astringent on all mucous surfaces. It has been employed with success in cases of gonorrhœa and gleet, also in leucorrhœa, diarrhœa, and chronic bronchitis. Its main action is exerted on the uro-genital system during its excretion in the urine.

Dose. 10 min. to 30 min., administered in capsules, or suspended with mucilage, or made into an emulsion with liquor potassæ.

PIPERACEÆ.

PIPER NIGRUM. Black Pepper. The unripe berries, dried, of Piper nigrum, or Black Pepper; growing in tropical countries, as Java and Sumatra, now chiefly imported from the East Indies.

Description. A berry about the size of a small pea, black, rough or wrinkled on the outside, the contained seed is hard and round, and of a yellowish-brown or grey colour; when decorticated it forms *white pepper.*

Prop. & Comp. Odour hot and aromatic; taste pungent and bitterish; contains a nitrogenised feeble base, isomeric with morphine, *Piperin* ($C_{17}H_{19}NO_3$), which when pure is in rhomboidal prisms, white, almost tasteless, and inodorous. A *volatile oil* ($C_{10}H_{16}$), lighter than water, giving the odour and taste to the drug, is also present, and besides the ordinary constituents of such fruits, there exists likewise some acrid resin. The piperin of commerce is always yellow and acrid from the presence of volatile oil.

Off. Prep. **Confectio Piperis.** *Confection of Pepper.* (Black pepper, in fine powder, two ounces; caraway, three ounces; clarified honey, fifteen ounces, rubbed well together.)

This preparation is a substitute for a nostrum long known as Ward's Paste, much used in the treatment of piles.

Pepper is contained in confection of opium, and in compound opium powder.

Therapeutics. Pepper is chiefly used as a condiment. It acts as a stimulant stomachic, and appears to influence the mucous membrane of the rectum, hence its value in hæmorrhoids; it also acts on the urethral membrane, and may be used as a substitute for cubebs in gonorrhœa, &c. Piperin probably possesses antiperiodic powers, and is stated to have been used with success in ague. Externally, pepper or its oil, may be employed as a rubefacient; the oil is sometimes applied topically in relaxed sore throat.

Dose. Of pepper, 5 gr. to 20 gr.; of piperin, 5 gr. upwards; of the confection, 60 gr. to 120 gr. or more.

CUBEBA. Cubebs. The unripe fruit, dried, of Piper Cubeba (Cubeba officinalis), the Cubeb Pepper; cultivated in Java.

OLEUM CUBEBÆ. Oil of Cubebs. The oil, distilled in Britain, from Cubebs.

OLEO-RESINA CUBEBÆ. Oleo-Resin of Cubebs.

Description. Very like black pepper, wrinkled, and having a small stalk or tail attached, of rather more than its own length, which serves to distinguish it; also lighter in colour.

Prop. & Comp. Cubeb pepper has an odour like camphor, in addition to that of pepper; its taste is hot and spicy; it contains *Cubebin*, a crystalline principle, which by some is said to be the same as piperin, but this is doubtful; the *volatile oil* is colourless or pale greenish-yellow, with the odour and taste of cubebs. The *resin* yields cubebic acid, and a volatile oil consisting of a hydrocarbon holding a camphor in solution.

Off. Prep. **Tinctura Cubebæ.** *Tincture of Cubebs.* (Cubebs, in powder, two and a half ounces; rectified spirit, a pint. Macerate and percolate.)

Therapeutics. Cubebs and the oil are used almost exclusively for their action on the mucous membrane of the urethra and bladder, upon which they act as stimulants, and have the power of arresting abnormal discharges from these surfaces. The oleo-resin is said to have special diuretic properties.

Dose. Of the powder, 30 gr. to 120 gr.; of the volatile oil, 5 min. to 20 min.; of the oleo-resin, 5 min. to 30 min.; of the tincture, ½ fl. drm. to 2 fl. drm.

MATICÆ FOLIA. Matico Leaves. The leaves of Piper angustifolium (Artanthe elongata), Matico Plant; a native of Peru.

Description. The leaves are from 4 to 8 inches long, oblong, lanceolate, acuminate, tesselated on the upper surface, the veins prominent on the under surface, the depressions formed by them densely clothed with hairs; of a green colour; with an aromatic and bitter taste; odour aromatic; as imported, the leaves are mixed with the stems, flowers and fruit, and are in a compressed state.

Prop. & Comp. Matico contains traces of tannic acid, and a peculiar acid named *artanthic acid;* nitrate of potassium, colouring matter, and a volatile oil or camphor (?) not yet isolated, are also found in the leaves. No piperin has been obtained from them, and they contain no starch.

Off. Prep. **Infusum Maticæ.** *Infusion of Matico.* (Matico leaves, cut small, half an ounce; boiling distilled water, ten fluid ounces.)

Therapeutics. The surface of the leaf or the powder applied to bleeding parts, as leech-bites, &c., acts as a powerful styptic; when given internally it is stated to produce astringent effects and to affect the genito-urinary mucous membrane and rectum, like pepper or cubebs; it contains little ordinary astringent matter, and it has been supposed that its power, when applied topically, is due to the mechanical structure of the leaf.

Dose. Of powder, internally, 30 gr. to 60 gr.; of infusion, 1 fl. oz. to 4 fl. oz.

SALICACEÆ.

SALICINUM. Salicin. $C_{13}H_{18}O_7$. A crystalline glucoside obtained from the bark of Salix Alba, and other species of Salix ; also from the bark of various species of Populus.

Prep. It is prepared from the bark of numerous varieties of the Willows and Poplars, by treating them with hot water, removing tannin and colouring matter from the decoction, evaporating, purifying, and recrystallising.

Prop. & Comp. Salicin occurs in colourless shining crystals, with a very bitter taste ; it is soluble in water and alcohol, insoluble in ether. The crystals melt when heated, and emit vapours having the odour of meadow-sweet. Concentrated sulphuric acid turns salicin of a bright red colour. By boiling it with dilute sulphuric acid, or acting upon it with emulsin (*see* Amygdala) salicin is converted into Saligenin and glucose : $C_{13}H_{18}O_7 + H_2O = C_7H_8O_2 + C_6H_{12}O_6$. Salicin and Saligenin may both be converted, by oxidation with sulphuric acid and bichromate of potassium, into Salicyl hydride, $C_7H_6O_2$; this is identical with the oil of *Spiræa Ulmaria*, or meadow-sweet, and exhales the same peculiar odour.

Therapeutics. Salicin is supposed to be tonic and antiperiodic, and has been much recommended in intermittents as a substitute for cinchona ; it was thought to possess considerable antiperiodic power, but it is not likely to supersede quinine, though possibly useful as a mild bitter tonic, when given in doses of from ten to twenty grains. The author once made many trials of salicin in cases both of ague and of intermittent neuralgia, and his experience amounts to this : that salicin is a drug devoid of any true antiperiodic property ; twenty to thirty grains, given three times a day, failed to check ague ; the same patients were cured at once by the exhibition of quinine ; the same negative results were found to follow its administration in neuralgia.

Salicin, salicylic acid, and salicylate of sodium may cause uneasiness in the epigastrium, nausea and vomiting, when given in large doses. Probably salicylic acid combines with an alkaline base within the stomach, enters the blood as a salicylate, and is once more separated from its combination by the action of carbonic acid. (Binz.) The alterations, described above, of salicin into saligenin and glucose, and of saligenin into salicyl hydride, may partially occur within the body, and may explain the similarity of action of salicin and salicylic acid.

Salicylic acid and salicylate of sodium in large doses lower the blood pressure; when given in cases of fever they produce some increase of the heart's action, free perspiration, and reduction of temperature; the degree of the latter not bearing any definite ratio to the amount of perspiration. As the temperature continues to fall, and the perspiration persists, there is a marked decline in the pulse rate.

Salicin, salicylic acid, and salicylate of sodium have been largely employed in the treatment of acute rheumatism. Dr. Maclagan regards them as antirheumatic, not simply antipyretic; the more acute the attack, the more beneficial is the effect, relief of pain and fall of temperature being the first signs of improvement. Dr. Maclagan prefers salicin as being less liable to adulteration, more pleasant in taste, and not giving rise to so much depression and subsequent anæmia. Salicin certainly is preferable in cases characterised by weak action of the heart from fatty degeneration; it is also safer when the vaso-motor system is depressed. These remedies cause the fever, joint-swelling, and pain to subside within a few hours, or almost always within two or three days, but they do not prevent the occurrence of relapses, nor of cardiac complications. If the fever persists in spite of their employment, other joints may become affected.

Salicin and salicylates may be given with advantage in typhoid fever and the various eruptive fevers, to reduce the temperature, but they do not shorten the normal duration of these diseases. They may also be used in pyæmia, septicæmia, puerperal fever and diphtheria.

Salicin taken internally appears in the urine as Salicyl hydride (oil of Spiræa), and causes that fluid to strike purple-red with the persalts of iron.

Dose. Of salicin, 3 gr. to 20 gr.; in acute rheumatism 10 gr. or more may be given in water every two, three or four hours.

LIQUIDAMBARACEÆ.

STYRAX PRÆPARATUS. Prepared Storax. Liquid balsam from Liquidambar orientalis; obtained from the bark in Asia Minor; purified by solution in rectified spirit, filtration, and evaporation. (*See* Benzoinum).

Description. Storax occurs in two forms; the *liquid balsam* (official), of the consistence of bird-lime, semi-transparent, with an aromatic odour, and of a brownish-yellow colour; and the *solid storax*, styrax calamita (not official), in the form of masses which are friable, of a brownish-red colour, covered on the surface with a white efflorescence of benzoic or cinnamic acid, and becoming soft and clammy with the heat of the hand. It consists of the liquid storax mixed with powdered liquidambar bark; sawdust, ashes, &c., being often substituted for the latter ingredient.

Prop. & Comp. Storax contains a principle named *Styracin*, *Cinnamic acid*, a peculiar *resin*, and *Styrol*.

Styracin ($C_{18}H_{16}O_2$), or cinnamate of cinnyl, is a crystalline solid, resolved by the action of alkalies into a cinnamate, and *Styrone* or cinnylic alcohol ($C_9H_{10}O$). It is sometimes obtained in a liquid and uncrystallisable state. It is insoluble in water, but soluble in ether, less so in alcohol.

Cinnamic acid ($C_9H_8O_2$) occurs in crystalline plates, and has powerful acid properties.

Styrol (C_8H_8) a colourless oil, of an aromatic odour, converted into benzoic acid by the oxidising action of chromic acid.

Storax when pure is soluble in alcohol and ether. Heated in a test-tube on the vapour bath, it becomes more liquid, but should give off no moisture. Boiled with solution of bichromate of potassium and sulphuric acid, it evolves the odour of hydride of benzoyl, similar to that of essential oil of bitter almonds.

Off. Prep. Storax is contained in Tinct. Benzoini Comp.

Therapeutics. The same as the balsams of Peru and Tolu.

Dose. Of prepared storax, 5 gr. to 20 gr.

CUPULIFERÆ.

QUERCUS CORTEX. Oak Bark. The dried bark of the small branches and stems of Quercus Robur (Quercus pedunculata), the Common Oak; indigenous. The bark should be collected in spring from plants growing in Britain.

Description. The bark, when dry, occurs [in long quills, generally covered with a greyish-white epidermis, of a fibrous consistence, brittle, internally cinnamon-coloured, as also is the outer surface, when denuded of the epidermis; the taste is very astringent.

Prop. & Comp. Oak bark yields to water and to spirit its active principles, viz., *tannic acid* and *gallic acid;* it also contains *pectin.* The amount of tannic acid varies very much with the age of the branches from which the bark is taken; the amount of astringent matter present in the bark is influenced by season and other circumstances.

Off. Prep. **Decoctum Quercûs.** *Decoction of Oak Bark.* (Bruised oak bark, one ounce and a quarter; distilled water, a pint.)

Therapeutics. Seldom used except as an external astringent, in the form of the decoction, which forms a useful and economical lotion, gargle, or injection, in relaxed sore throat, leucorrhœa, &c. It may be given internally in the cases in which tannic acid is useful.

Dose. Of decoction, 1 fl. oz. to 2 fl. oz., when internally administered.

GALLA. Galls. Excrescences occurring on the small twigs of Quercus lusitanica, *var.* infectoria (Quercus infectoria), the Gall or Dyer's Oak, growing chiefly in Asia Minor, caused by the punctures and deposited egg or eggs of Cynips Gallæ tinctoriæ.

ACIDUM TANNICUM. Tannic acid. $C_{27}H_{22}O_{17}$. An acid extracted from Galls.

ACIDUM GALLICUM. Gallic Acid. $H_3C_7H_3O_5,H_2O$. An acid prepared from Galls.

Description of the Gall. The puncture of the young twig of the tree by a hymenopterous insect, the *cynips gallæ tinctoriæ,* causes the growth of an excrescence, made up of parenchymatous tissue, traversed here and there by isolated bundles of vessels; the eggs deposited by the insect become enclosed in the excrescence. Gall-nuts are more or less globular in form, tuberculated on the surface, about the size of a marble, varying from half an inch to three-quarters of an inch in diameter. There are two varieties, blue and white galls; the former, the official variety, are heavy and of a bluish-green, or dark olive-green tinge externally, yellowish-white within, with a small central cavity.

Prop. & Comp. Gallnuts contain a very large amount, about 35 per cent., of *tannic acid,* and 5 per cent. of *gallic acid,* also another body, named *ellagic acid*, with gummy and extractive matters, lignin, salts, &c.

TANNIC ACID ($C_{27}H_{22}O_{17}$) is obtained by exposing powdered galls to a damp atmosphere for a few days, and then adding sufficient ether to make a paste; letting this stand for twenty-four hours, compressing it in a linen bag, and preserving the liquid portion. The pressed cake is then pulverised, and made into a paste with ether, to which a sixteenth of its bulk of water has been added, and again pressed. The expressed liquids are mixed and evaporated with the aid of a little heat till they are of the consistency of a soft extract, which is then dried on earthen dishes at a temperature not above 212° F. (100° C.). The mode in which the ether acts in this process is not well understood, anhydrous ether being a very bad solvent of tannic acid.

Tannic acid, a glucoside, occurs in the form of a light vesicular mass or powder consisting of thin glistening scales, yellowish, or almost white; uncrystallisable, of a very astringent taste, freely soluble in water and spirit, but very sparingly so in ether; acid in reaction; its solutions precipitate isinglass yellowish-white, and the persalts of iron bluish-black. It leaves no residue when burnt in air.

GALLIC ACID ($H_3C_7H_3O_5,H_2O$) is prepared by boiling one part of coarsely powdered galls with four fluid parts of dilute sulphuric acid for half an hour, then straining through calico while hot, and collecting the crystals deposited on cooling. It is purified with animal charcoal and repeated crystallisation. In this process glucose is formed at the same time, thus: $C_{27}H_{22}O_{17} + 4H_2O = 3H_3C_7H_3O_5 + C_6H_{12}O_6$.

Gallic acid occurs in white or pale fawn-coloured acicular prisms or silky needles, very sparingly soluble in cold water (1 part in 100), but dissolving readily in boiling water, and rectified spirit.

It does not precipitate isinglass, albumen, or the alkaloids, but it strikes bluish-black with the persalts of iron; its taste is acid and astringent, but much less so than that of tannin, perhaps owing to its slight solubility in the saliva. The crystalline acid when dried at 212° F. (100° C.) loses 9·5 per cent. of its weight. It leaves no residue when burned with free access of air.

Ellagic Acid ($C_{14}H_6O_8$) exists in gallnuts in small quantities; it forms a white crystalline powder, differing from tannin and gallic acid in being almost insoluble in water, alcohol, or ether.

Probably ellagic acid is contained in many vegetables, for some of the intestinal concretions, called *bezoars*, found in the intestines of ruminants, are entirely composed of it.

Off. Prep.—Of Galls:

Tinctura Gallæ. *Tincture of Galls.* (Galls, bruised, two and a half ounces; proof spirit, a pint. Prepared by maceration and percolation.) The tannic acid contained in it is converted after a time into gallic acid.

Unguentum Gallæ. *Ointment of Galls.* (Galls, in fine powder, eighty grains; benzoated lard, one ounce.)

Unguentum Gallæ cum Opio. *Ointment of Galls and Opium.* (Ointment of galls, one ounce; opium, in powder, thirty-two grains.)

Of Tannic Acid:

Glycerinum Acidi Tannici. *Glycerine of Tannic Acid.* (Tannic acid, one ounce; glycerine, four fluid ounces. Stir them together in a porcelain dish, and apply a gentle heat until complete solution is effected.)

Suppositoria Acidi Tannici. *Tannic Acid Suppositories.* (Tannic acid, thirty-six grains; oil of theobroma, one hundred and forty-four grains. Divide the mass into twelve suppositories, each of which contains three grains of tannic acid.)

Suppositoria Acidi Tannici cum Sapone. *Tannic Acid Suppositories with Soap.* (Tannic acid, thirty-six grains; glycerine of starch, thirty grains; curd soap, in powder, one hundred grains. Add enough starch to form a paste, and divide the mass into twelve suppositories, each of which contains three grains of tannic acid.)

Trochisci Acidi Tannici. *Tannic Acid Lozenges.* (Tannic acid made into lozenges, with tincture of tolu, sugar, gum acacia, mucilage of gum acacia, and water.) Half a grain of tannic acid is contained in each lozenge.

Of Gallic Acid:

Glycerinum Acidi Gallici. *Glycerine of Gallic Acid.* (Gallic acid, one ounce; glycerine, four fluid ounces. Stir them together in a porcelain dish, and apply a gentle heat until complete solution is effected.)

Therapeutics. Gall-nuts owe their efficacy to the tannic and gallic acids contained in them; and the description of the action of these acids applies not only to galls, but to all those vegetables which are made use of for their astringent effects.

Tannic acid, when applied to a living part, acts as a most powerful astringent; if the surface of a mucous membrane is chosen, this effect is well seen in the contraction of the vessels and consequent paleness produced. When the lips, or any part of the mouth, come in contact with this acid, the astringency becomes evident to the taste.

Taken internally, tannic acid sometimes causes a sensation of dryness of the mouth and fauces, thirst, and not unfrequently constipation; it soon becomes absorbed into the blood, and after some alteration in composition, is thrown out, or at least partly so, by the kidneys in the form of gallic and pyrogallic acids, and a brownish-black humus-like matter; sometimes the urine becomes quite dark-coloured, especially after it has been exposed to the air for a short time. The urine of patients taking tannic acid does not precipitate isinglass, showing the absence of tannic acid, but strikes black with persalts of iron, indicating the presence of gallic acid. Upon the alimentary canal, and also after absorption, the action of tannic acid is of the same character; hence, not only topical but remote astringent effects are produced by its administration.

Gallic acid appears to differ from tannin in its topical action, being less astringent, probably from its comparatively slight solubility and absence of coagulating power; it however becomes absorbed, and the remote effects are identical with those of tannic acid.

Tannic acid may be given either on account of its direct or its remote effects; for the former it is administered in affections of the mucous membrane of the alimentary canal. Probably as a remote astringent, gallic acid is more powerful than an equal quantity of tannic acid, for the latter becomes converted in the blood into gallic acid and grape sugar, and therefore only a part of it is available. This was the conclusion at which the author arrived from extensive trials made many years since, in the treatment of various forms of hæmorrhage. Both tannic and gallic acids may be administered in menorrhagia, hæmaturia, and hæmoptysis, also in cases where there is increased mucous discharge, as in diarrhœa and dysenteric affections; likewise to diminish excessive or hectic sweating.

Topically, the decoction of gallnuts, the solutions of tannic or gallic acid, the glycerine compounds, the lozenge, the suppository, and the ointments, may be employed to suppress hæmorrhage from any part to which they can be applied; also to brace up and lessen discharges from mucous membranes, as in gleet, leucorrhœa, hæmorrhoids, &c.

Dose. Of the tincture of galls (seldom used, except as a test), $\frac{1}{2}$ fl. drm. to 2 fl. drm.; of tannic acid, 2 gr. to 10 gr.; of gallic acid, 2 gr. to 10 gr.; about 4 gr. of gallic acid can be dissolved in 1 fl. oz. of water.

Incompatibles. Salts of iron, especially the persalts, strike black with both tannic and gallic acids; infusions and decoctions of vegetable substances containing alkaloids, solution of isinglass, and many metallic substances, as salts of lead, antimony, &c., are precipitated by tannic acid, and hence it should not be administered with them in solution, although the compounds thus formed are probably of value as remedial agents.

MORACEÆ.

FICUS. The Fig; the dried fruit of Ficus Carica; a native of Asia; imported from Smyrna.

Description. The fig consists of a fleshy compressed pear-shaped receptacle, soft, tough and brown; it is covered with a saccharine efflorescence, and contains numerous small hard seed-like achenes in the interior, enclosed in a viscid pulp. These are quite shut in, except at the apex, where a small orifice exists. When nearly ripe the fresh figs are dried and exported largely to this country and other parts of Europe.

Prop. & Comp. They contain chiefly saccharine and mucilaginous matters.

Off. Prep. Figs are used in the preparation of confectio sennæ.

Therapeutics. Demulcent, nutritive, and laxative; used sometimes as an article of diet for this latter property. Heated and split open, figs are sometimes used as cataplasms.

Dose. Ad libitum.

MORI SUCCUS. Mulberry Juice; the juice of the ripe fruit of Morus nigra; native of Persia, cultivated in Britain.

Description, Prop. & Comp. The juice is of a dark violet or purple colour, and has a faint odour and a sweet, saccharine, acidulous taste; the latter is said to be due to the presence of tartaric acid. Sp. gr. about 1·06.

Off. Prep. **Syrupus Mori.** *Syrup of Mulberries.* (Mulberry juice, twenty fluid ounces; sugar, two pounds and a quarter; rectified spirit, two fluid ounces and a half. Heat the mulberry juice to the boiling point, and filter it when it has cooled. Dissolve the sugar in the filtered liquid with a gentle heat, and add the spirit. The product should weigh three pounds six ounces, and should have sp. gr. 1·33.)

Therapeutics. The juice is refrigerant, and may be used as a drink in febrile diseases. The syrup is often used as a colouring matter.

Dose. Of the syrup, 1 fl. drm. or more.

CANNABINACEÆ.

CANNABIS INDICA. Indian Hemp; the dried flowering or fruiting tops of the female plants of Cannabis sativa. Hemp from which the resin has not been removed is alone to be employed, and also that only which is cultivated in India.

Description. The tops are met with in bundles, about two inches long, consisting of one or more alternate branches, with the remains of the flowers, a few ripe fruits, and small leaves, pressed together by adhesive resinous matter; or cannabis indica may occur in the form of straight, stiff woody stems several inches long, surrounded by the branched flower-stalks. It is rough to the touch, very brittle, of a dusky green colour, and with a faint narcotic not unpleasant odour. In commerce Indian hemp is seen in three principal forms. The resinous exudation of the leaves and flowers is known as *Churrus;* the plant itself, consisting of the stems, leaves, and flowers, packed together lengthwise in long bundles, *Gunjah*, or *Ganga;* and lastly, a mixture of the leaves and capsules, without the stem, *Bang*. The *Hashish* of the Arabs is another form of Indian hemp, sometimes occurring in coils.

Prop. & Comp. The *resin* of the Indian hemp, upon which its peculiar properties depend, is soluble in alcohol and ether, but separates from its solutions on the addition of water. The resin mentioned above has received the name *Cannabin*, and has a bitterish taste and peculiar odour; the plant also contains a little volatile oil.

Off. Prep. **Extractum Cannabis Indicæ.** *Extract of Indian Hemp.* (Indian hemp, in coarse powder, one pound; rectified spirit, four pints. Prepared by maceration of the hemp in rectified spirit for seven days, and subsequent separation of the spirit by distillation, and evaporation of what remains to a proper consistence to form pills.)

Tinctura Cannabis Indicæ. *Tincture of Indian Hemp.* (Extract of Indian hemp, one ounce; rectified spirit, twenty fluid ounces.)

Therapeutics. Indian hemp produces a peculiar kind of intoxication, attended with exhilaration of the spirits and hallucinations, said to be generally of a pleasing kind. These are followed by narcotic effects, sleep and stupor. In its anodyne and soporific action it resembles opium, but its after-effects are considered less unpleasant; it does not produce constipation nor loss of appetite.

Indian hemp possesses antispasmodic and anodyne powers, for which it has been chiefly employed in medicine. It has been administered in the different forms of neuralgia, in spasmodic coughs, as pertussis and asthma, also in tetanus, hydrophobia, and other anomalous spasmodic and painful diseases. Sometimes, but very seldom, it has been used to procure sleep. Much further experience of this drug is required before its real action and value can be fully decided upon; it certainly has disappointed the expectations formed of it when it was first introduced into this country; a circumstance perhaps in part due to very inferior hemp having been employed. The urine of patients under its influence sometimes acquires a peculiar odour not very unlike that of the Tonquin bean.

The author had under his care, some years since, a man who took as much as four fluid drachms of the tincture of Indian hemp three times a day without experiencing any unpleasant symptoms; but the same patient was an opium-eater to a very great extent: this would appear to show that a tolerance of opium imparts to the system a similar power of resisting the influence of Indian hemp. The tincture employed was shown to be genuine, for as little as fifteen minims produced well-marked symptoms in some other patients.

Dose. Of the extract, ¼ gr. to 1 gr. or more; of the tincture, 5 min. to 30 min.

Incompatibles. The tincture, when added to water, becomes turbid, from the precipitation of the resin, and hence it should be rubbed up with mucilage, to suspend it; any alkaline liquid, as aromatic spirit of ammonia, which is at times ordered to keep it in solution, destroys the activity of the Indian hemp.

LUPULUS. Hop. The dried strobiles of Humulus Lupulus, the common Hop; cultivated in England, and found in many parts of Europe.

LUPULINUM. Lupulin. *Synonym.* Lupulinic Glands. A glandular powder obtained from the dried strobiles of Humulus Lupulus.

Description. The strobile of the hop is composed of membranous scales, each of which contains at the base a small rounded achene, surrounded by a yellow granular powder (lupulin). The scale is covered with numerous superficial glands; it is thin, semi-transparent, veined, and of a yellowish colour when dry, with an agreeable fragrant odour and bitter taste. *Lupulin* is obtained by rubbing and sifting the strobiles; it occurs as a golden yellow powder, and has the peculiar flavour of the hop; under the microscope it resembles the pollen of plants.

Prop. & Comp. The active principles of hops reside chiefly, though not entirely, in the lupulin. *Lupulin* is a yellow, aromatic powder, containing a volatile oil, a resin, a nitrogenous substance, a gummy substance, and a bitter principle. Tannic acid is also present (about 5 per cent.). The bitter principle, soluble in alcohol, slightly so in water, but insoluble in ether, is called *Lupulite* or *Humulin.* The *volatile oil,* when freshly prepared by distillation of the hops, is green, but it is colourless when redistilled; by exposure to the air, it becomes a resinous mass. It contains a hydrocarbon ($C_{10}H_{16}$), and *valerol* ($C_6H_{10}O$); the latter by the action of caustic potash is converted into *valerianic acid,* and thus the hydrocarbon may be separated from the valerol. The volatile oil was formerly thought to contain sulphur; this, however, has been lately disproved. The scales of the hop contain some adherent lupulin, though in a small proportion. Lupulin yields about 11 per cent. of the bitter principle. It burns readily, and on incineration should not yield more than about 15 per cent. of ash. Not more than about 30 or 40 per cent. should be insoluble in ether.

Off. Prep. **Infusum Lupuli.** *Infusion of Hop.* (Hops, half an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Lupuli. *Tincture of Hop.* (Hop, two ounces and a half; proof spirit, a pint. Prepared by maceration and percolation.)

Extractum Lupuli. *Extract of Hop.* (Prepared by maceration of the hop in rectified spirit, and afterwards boiling with water, mixing the two products, and evaporating at a temperature not exceeding 140° F (60° C.) to a proper consistence.)

Therapeutics. Hops are tonic and stomachic, and slightly narcotic. In the form of bitter beer, taken with meals, they form a useful aid to digestion in some cases of atonic dyspepsia. The volatile oil is probably the narcotic principle, and in the form of a pillow, hops have been found anodyne and narcotic. Hops have been asserted to be useful in diminishing the tendency to nocturnal emissions, and also in allaying chordee. The preparations of hop are not much employed in this country except as adjuncts. Lupulin is aromatic and bitter, and is occasionally used in insomnia and for alcoholism.

Dose. Of lupulin, 2 gr. to 5 gr.; of the infusion of hops, 1 fl. oz to 2 fl. oz.; of the extract, 5 gr. to 15 gr.; of the tincture, fl. drm. to 2 fl. drm.

CONIFERÆ OR PINACEÆ

OLEUM TEREBINTHINÆ. Oil of Turpentine. Oil distilled, usually by aid of steam, from the oleo-resin or Turpentine of Pinus Australis (Pinus palustris), Pinus Tæda and sometimes Pinus Pinaster; imported from America and France. Rectified if necessary.

RESINA. Resin. The residue of the distillation of the oil of turpentine from the crude oleo-resin of various species of Pinus.

Description. American turpentine, as it flows from the trunks of the above-named trees, has the consistence of treacle, altering much with heat and exposure; of a pale yellow colour; with a peculiar characteristic pungent odour and taste. When distilled, the oil of turpentine passes over, the resin remaining in the retort.

Oil of Turpentine, called also Spirits of Turpentine or Camphine, is a limpid colourless fluid, with the same odour and taste as the above.

Resin or *Rosin* is a solid semi-transparent yellowish substance, compact, brittle, pulverisable, with faintly terebinthinate odour and taste.

Prop. & Comp. Common turpentine consists of a mixture of the resin dissolved in the volatile oil, and separable by distillation.

The *Oil of Turpentine* ($C_{10}H_{16}$) is inflammable, it mixes with other oils, fixed or volatile, is soluble in alcohol and ether, and dissolves many bodies, as fats, resins, &c.; it partly resinifies, partly volatilises, on exposure, and forms an artificial camphor ($C_{10}H_{16}HCl$) with hydrochloric acid gas. It commences to boil at about 320° F. (160° C.), and almost entirely distils below 356° F. (180° C.).

The *Resin* is easily fusible, and burns with a dense yellow flame and much smoke. It consists largely of abietic anhydride ($C_{44}H_{62}O_4$), this is transformed into abietic acid ($C_{44}H_{64}O_5$) by the action of alcohol. A small proportion of pimaric acid can be obtained from resin.

Off. Prep.—Of Oil of Turpentine:

Confectio Terebinthinæ. *Confection of Turpentine.* (Oil of turpentine, one fluid ounce; liquorice root, in powder, one ounce; clarified honey, two ounces.)

Enema Terebinthinæ. *Enema of Turpentine.* (Oil of turpentine, one fluid ounce; mucilage of starch, fifteen fluid ounces.)

Linimentum Terebinthinæ. *Liniment of Turpentine.* (Oil of turpentine, sixteen fluid ounces; camphor, one ounce; soft soap, two ounces; distilled water, two fluid ounces.) Mix the soap with the water; dissolve the camphor in the oil of turpentine; then rub these fluids together until thoroughly mixed.

Linimentum Terebinthinæ Aceticum. *Liniment of Turpentine and Acetic Acid.* (Oil of turpentine, four fluid ounces; glacial acetic acid, one ounce; liniment of camphor, four fluid ounces.)

Unguentum Terebinthinæ. *Ointment of Turpentine.* (Oil of turpentine, one fluid ounce; resin, in coarse powder, fifty-four grains; yellow wax and prepared lard, each half an ounce.

Of Resin:

Emplastrum Resinæ. *Resin Plaster.*
Synonym. Adhesive plaster. (Resin, four ounces; lead plaster, two pounds; curd soap, two ounces.)

Unguentum Resinæ. *Ointment of Resin.* (Resin, in coarse powder, eight ounces; yellow wax, four ounces; simple ointment, sixteen ounces; almond oil, two fluid ounces.)

Resin also forms an ingredient of several other plasters, of turpentine ointment, and of blistering paper.

Therapeutics. In small doses, oil of turpentine becomes absorbed, and acts as a stimulant, antispasmodic, and astringent; its effects are specially directed to the kidneys, causing diuresis, and from the oil becoming altered in character in passing through the system, it communicates to the urine an odour not unlike violets. Oil of turpentine influences the mucous membrane of the genito-urinary organs in a manner similar to copaiba, and in large doses produces strangury; its astringent property upon the capillary vessels is seen in its power of arresting hæmorrhage, and controlling some forms of inflammation.

In large doses, turpentine acts as a purgative, and possesses great power of destroying entozoa in the alimentary canal; its purgative operation is often accompanied by nausea and vomiting, and a species of intoxication, resulting from the absorption of a portion of the drug.

Oil of turpentine is occasionally administered by the stomach as an antispasmodic in hysterical affections, but it is generally employed as an enema; it is also used in passive forms of intestinal and urinary hæmorrhage, in purpura, and in some forms of iritis; its most frequent internal use is however as an anthelmintic, in cases where tænia, ascarides, or other entozoa are present in the intestines.

Oil of turpentine, when externally applied, produces powerful rubefacient effects, and if the vapour is confined, even vesication; administered as an enema, both the purgative and stimulant effects may be produced. Externally it is used in the form of the liniments of the Pharmacopœia over chronically inflamed and painful parts, or sprinkled on hot flannel as a fomentation in tympanitic conditions of the abdomen resulting from peritoneal inflammation.

Resin and *Common Turpentine* are seldom used except as external stimulant applications: the former in the form of ointment or plaster; the latter, not now official, was until lately employed either alone, or in combination with other resins, as elemi, galbanum, &c.

Dose. Of oil of turpentine, as a stimulant, antispasmodic, or diuretic, 10 min. to 30 min.; as an anthelmintic purgative, 2 fl. drm. to 4 fl. drm.; of the confection, 60 gr. to 120 gr.; of resin, 10 gr. to 30 gr. if administered internally.

TEREBINTHINA CANADENSIS. Canada Turpentine. *Synonym.* Canada Balsam. The turpentine obtained by puncturing or incising the bark of the trunk and branches of Pinus Balsamea (Abies Balsamea), The Balm of Gilead Fir. From Canada.

Description. A pale yellow oleo-resin, ductile, of the consistence of thin honey, drying very slowly by exposure in the air into a transparent adhesive varnish; mixed with one-sixth of its weight of magnesia, it solidifies. It has a peculiar agreeable terebinthinate odour, and an acrid, slightly bitter taste.

Therapeutics. Canada balsam resembles the other turpentines in its action, but is not often given as a medicine.

Dose. 20 gr. to 30 gr.

Use. It is employed in making flexible collodion and blistering paper; it is also used to mount objects for the microscope, and for other optical purposes.

LARICIS CORTEX. Larch Bark. The bark, deprived of its outer rough layer, of Pinus Larix (Abies Larix), the Common Larch.

Description. In flattened pieces, or quills of various lengths and sizes. Inner surface yellow and fibrous; outer surface, where denuded of epidermis, of a warm reddish hue; elsewhere, coated with a greyish epidermis, irregularly fissured and blotched with lichens, or beaded with resinous exudation; fracture close, the fractured surfaces being of a deep carmine-red colour, except internally. Odour faintly terebinthinate; taste astringent.

Prop. & Comp. Contains *larixin* or *larixinic acid* and a peculiar tannin, which strikes olive green with salts of iron.

Off. Prep. **Tinctura Laricis.** *Tincture of Larch.* (Larch bark, in fine powder, two and a half ounces; rectified spirit, one pint.) Prepared by maceration and percolation.

Therapeutics. Resembles other terebinthinate and balsamic remedies in its action, but is more agreeable to the taste and less liable to interfere with digestion. It is employed in chronic bronchitis with abundant secretion as a stimulant expectorant. Also in cystitis and purpura.

Dose. Of the tincture, 20 min. to 30 min.

Terebinthina Veneta, Venice turpentine, is the liquid resinous exudation of Abies larix. It is occasionally used as a substitute for the other turpentines, which it resembles in its action. It is seldom met with in a pure state. (Not official.)

THUS AMERICANUM. Common Frankincense. The concrete turpentine which is scraped off the trunks of Pinus Tæda, the Frankincense, and Pinus Australis (Pinus palustris), Swamp pine; from the southern states of North America. The turpentine after exuding from the bark becomes hardened in the air.

Description. When fresh it is a softish, bright yellow, opaque solid; resinous but tough, with the odour of American turpentine; by keeping it becomes dry and brittle, darker in colour, and of a milder odour. *True Frankincense,* the natural exudation from Abies excelsa, is not at present imported into this country.

Prop. & Comp. Chemically, American frankincense is not known to differ from common resin; it may, however, contain more or less volatile oil.

Off. Prep. Contained in Emplastrum Picis.

PIX BURGUNDICA. Burgundy Pitch. A resinous exudation from the stem of Pinus Picea (Pinus Abies, or Abies excelsa); the Spruce Fir; melted and strained; imported from Switzerland.

Description. Hard and brittle, yet gradually taking the form of the vessel in which it is kept; opaque, varying in colour, but generally dull reddish-brown; of an agreeable, aromatic odour and taste, without bitterness.

Prop. & Comp. Burgundy pitch consists chiefly of resin, but a little volatile oil is present, imparting to it its odour. The resin probably contains the same or similar acids to those found in American frankincense, or common resin obtained from turpentine.

Off. Prep. **Emplastrum Picis.** *Pitch Plaster.* (Burgundy pitch, twenty-six ounces; common frankincense, thirteen ounces; resin, four ounces and a half; yellow wax, four ounces and a half; expressed oil of nutmeg, one ounce; olive oil, two fluid ounces; water, two fluid ounces.)

Burgundy pitch also enters into the composition of the iron plaster.

Therapeutics. Burgundy pitch acts externally as a slight stimulant to the skin.

Adulteration. True Burgundy pitch is seldom met with in commerce. A fictitious Burgundy pitch is often sold, made of common resin, coloured, and made opaque with yellow ochre, palm oil, water, &c.

OLEUM PINI SYLVESTRIS. Fir-wool Oil. The oil distilled from the fresh leaves of Pinus sylvestris, the Scotch fir.

Description & Prop. This oil is colourless or nearly so, with an aromatic lavender-like odour, and a pungent but not unpleasant flavour. Sp. gr. not below 0·870. It is soluble in about seven times its volume of rectified spirit.

Off. Prep. **Vapor Olei Pini Sylvestris.** *Inhalation of Fir-Wool Oil.* (Fir-wool oil, forty minims; light carbonate of magnesium, twenty grains; water, a sufficiency. Rub the oil with the carbonate of magnesium, and gradually add sufficient water to produce one fluid ounce.) When required for use, put one fluid drachm into an inhaler with half a pint of cold water and half a pint of boiling water

Therapeutics. Fir-wool oil is employed as an embrocation for rheumatic joints or muscles, and as an addition to baths in rheumatism. The vapour may be inhaled in sore-throat and in chronic laryngitis.

PIX LIQUIDA. Tar. A liquid bitumen prepared from the wood of Pinus sylvestris, the Scotch fir, and other pines by destructive distillation.

Description. *Tar* is a dark brown or blackish, semi-liquid substance, with a peculiar well-known aromatic odour; water agitated with it acquires a pale brown colour, sharp empyreumatic taste, and acid reaction.

Prop. & Comp. *Tar* is very complex in composition; it contains pyroligneous acid, methyl alcohol, acetic acid, and oily bodies, with toluene, xylene, and other hydrocarbons. When shaken with water in the proportion of about one part of tar to four parts of water, tar-water is produced, from the solution of the soluble matter of tar.

Pitch is the altered resin, resulting from the distillation of tar.

Off. Prep. **Unguentum Picis Liquidæ.** *Ointment of Tar.* (Tar, five ounces; yellow wax, two ounces.)

Therapeutics. Tar is both an internal and external stimulant, useful in certain chronic skin diseases, as psoriasis, eczema, and pityriasis rubra; in some cases of inveterate psoriasis the influence of tar both as an internal and external remedy is very marked; the skin of the patients entirely under its influence becoming quite or all but free from the eruption; the disease is, however, very liable to return. Tar also influences the mucous membranes when given internally, and has been found useful in bronchitic affections, and in diseases of the mucous membrane of other passages, as an alterative. The vapour of tar has been used with advantage in chronic bronchitis and phthisis. It sometimes causes a dark coloration of the urine. (*See* Carbolic Acid.)

Dose. Of tar, 20 min. to 1 drm. and upwards, made into pills with flour, or given as tar-water in doses of 1 fl. oz. to 4 fl. oz.

OLEUM JUNIPERI. Oil of Juniper. The oil distilled in Britain from the full-grown unripe green fruit of Juniperus communis, or Common Juniper; growing in Northern Europe, &c.

Description. The oil of juniper is colourless or of a pale greenish-yellow colour, having in a high degree the odour and warm aromatic taste of the fruit.

The fruit or berries are about the size of black currants, and when fully ripe, are of a dark purple colour, with a bloom upon the surface, and filled with a brownish-yellow pulp; their odour is agreeable, but slightly terebinthinate.

Prop. & Comp. The oil of juniper ($C_{10}H_{16}$) has sp. gr. 0·855. Some *resin*, from the oxidation of the oil which quickly becomes altered, also sugar, wax, &c., are found in the fruit in addition to the oil.

Off. Prep. **Spiritus Juniperi.** *Spirit of Juniper.* (Oil of juniper, one fluid ounce; rectified spirit, forty-nine fluid ounces.)

Therapeutics. Oil of juniper is a powerful stimulant, its action being especially directed to the kidneys. It is used in medicine chiefly on account of its diuretic action; and has been found valuable in different forms of dropsies, either given alone, or combined with other diuretics. Experiments on a *healthy* man show that it increases the urea and solids, while slightly reducing the urinary water. It is contained in Hollands and gin. The spirit of juniper is employed in the preparations of creasote mixture.

Dose. Of the oil, 1 min. to 4 min.; of the spirit of juniper, 30 min. to 1 fl. drm.

OLEUM CADINUM. Oil of Cade. (Huile de Cade.) (Not official.) An oil obtained in Germany and France, from the dry distillation of the wood of Juniperus Oxycedrus. It occurs as a slightly thick, black liquid, with a tarry odour. It has long been employed in veterinary medicine; and was introduced as an external remedy in the treatment of chronic cutaneous diseases, as psoriasis, eczema, favus, &c., in short, of the same affections for which ordinary tar has been found effectual. It may be employed either in the form of an ointment, made with equal parts of the oil and fatty matters; or made into a soap; or diluted with spirit as a lotion. The composition of this oil is probably almost identical with that of common tar oil, and although probably a useful external remedy, it requires trustworthy clinical evidence to show that it is superior to other terebinthinate preparations.

SABINÆ CACUMINA. Savin Tops. The fresh and dried tops of Juniperus Sabina; collected in spring from plants cultivated in Britain.

OLEUM SABINÆ. Oil of Savin. The oil distilled in Britain from fresh savin tops.

Description. The *fresh tops* consist of the young branches enveloped in minute imbricated adpressed leaves, in four rows, of a dark green colour (or when dried yellowish-green), with a strong and peculiar disagreeable odour and taste. The leaves have a large oval depressed central gland on their back.

The *Oil* is colourless or pale yellow, with the odour and taste of the tops.

Prop. & Comp. The tops owe their activity to the *volatile oil*, oleum sabinæ ($C_{10}H_{16}$); besides which, a *resin*, gallic acid, and the ordinary ingredients of young tops are present.

Off. Prep. Of Savin Tops. **Tinctura Sabinæ.** *Tincture of Savin.* (Savin tops, dried and bruised, two ounces and a half; proof spirit, one pint. Prepared by maceration and percolation.)

Unguentum Sabinæ. *Ointment of Savin.* (Fresh savin tops, bruised, eight ounces; yellow wax, three ounces; benzoated lard, sixteen ounces. Melt together the lard and wax in a water-bath, add the savin, and digest for twenty minutes; then express through calico.)

Therapeutics. Savin acts as an irritant both internally and externally; it also appears to exert much power upon the uterus as an emmenagogue. It is used externally, in the form of the ointment, to keep up the discharge from blistered surfaces; and it is given internally in some cases of deficient menstruation, when unattended with congestion of the pelvic organs. In large doses it causes abortion, and its administration, often criminal, is attended with much danger. Savin should not be given in pregnancy.

Dose. Of dried tops in powder, 4 gr. to 10 gr., and upwards; of the oil of savin, 1 min. to 4 min. (suspended); of tincture of savin, 20 min. to 1 fl. drm.

CLASS II. ENDOGENÆ.

ZINGIBERACEÆ.

ZINGIBER. Ginger. The rhizome, scraped and dried, of the Zingiber officinale, Ginger; native of Hindostan, but cultivated in the West as well as in the East Indies.

Description. The rhizome is generally about three or four inches in length, and occurs in flattish irregularly branched pieces, with a depressed scar at the summit of each branch; yellowish-white, but not chalky on the surface, with a short mealy fracture. Powder, yellowish white. In commerce there are two principal varieties, the white or Jamaica, and the black or East Indian; for the former, the best pieces are selected, scraped, scalded, and dried by exposure to the sun; the black variety is dried without being first scraped, hence it is the larger of the two.

Prop. & Comp. Odour spicy and aromatic; taste warm and pungent. In addition to the ordinary constituents of roots, it contains a *volatile oil* and a *resinous matter*, upon which its pungency seems to depend. The quantity of starch contained in the rhizome is considerable.

Off. Prep. **Syrupus Zingiberis.** *Syrup of Ginger.* (Strong tincture of ginger, six fluid drachms; syrup, nineteen fluid ounces.)

Tinctura Zingiberis. *Tincture of Ginger.* (Ginger in powder, two ounces and a half; rectified spirit, one pint. Prepared by maceration and percolation.)

Tinctura Zingiberis Fortior. *Strong Tincture of Ginger.*
Synonym. Essence of Ginger. (Ginger, in fine powder, ten ounces: rectified spirit, a sufficiency. Percolate with half a pint of the spirit, and add more till a pint has been collected.)

Ginger is contained in many of the compound powders and other official preparations.

Therapeutics. Ginger is an aromatic stimulant and carminative. When taken internally it produces an agreeable feeling of warmth at the epigastrium, and appears to aid digestion by giving a healthy tone to the stomach; hence it is used in atonic forms of dyspepsia, especially if attended with much flatulence, and as an adjunct to various purgative medicines, to correct their griping tendency. When chewed it acts as a sialagogue, and is sometimes used in relaxed states of the uvula and tonsils.

Dose. In powder, 10 gr. to 20 gr. and upwards; of the syrup, 1 fl. drm.; of tincture, 15 min. to 1 fl. drm.; of the strong tincture, 5 min. to 20 min.

CARDAMOMI SEMINA. Cardamoms. The dried ripe seed of Elettaria Cardamomum, the Malabar Cardamom; native of Malabar. The seeds are best kept in their pericarps, in which condition they are imported; but when required for use they should be separated, and the pericarps rejected.

Description. The pericarps vary in length from about two-fifths of an inch to nearly an inch, and are from about one-fifth to two-fifths of an inch broad; they are oblong-triangular, the angles being somewhat rounded off, wrinkled, and of a light yellow colour, divided into three compartments, each of which contains numerous seeds, about one-sixth of an inch long, triangular in shape, corrugated, of a dark reddish-brown, internally white. The seeds only ought to be used. Cardamoms are distinguished according to their lengths by the respective names of shorts, short-longs, and longs.

Prop. & Comp. The seeds have a fragrant odour, which depends on the presence of a *volatile oil*, of an aromatic taste, said to have a sp. gr. of 0·945; the amount yielded is about 4·5 per cent. The seeds contain in addition a fixed oil, together with *colouring matter* and salts, &c.

Off. Prep. **Tinctura Cardamomi Composita.** *Compound Tincture of Cardamoms.* (Cardamom seeds bruised, caraway bruised, each a quarter of an ounce; raisins, freed from their seeds, two ounces; cinnamon bark, bruised, half an ounce; cochineal in powder, fifty-five grains; proof spirit, twenty ounces. Prepared by maceration and percolation.)

Cardamoms are also an ingredient of many other preparations, as compound decoction of aloes, aromatic iron mixture, compound senna mixture, and compound tincture of chloroform.

Therapeutics. It is an agreeable aromatic stimulant, stomachic, and carminative; used in the East as a condiment. Chiefly employed as an adjunct to purgative and other medicines, to correct any tendency to griping.

Dose. Of the seeds, powdered, 5 gr. to 20 gr.; of the compound tincture, ½ fl. drm. to 2 fl. drm.

IRIDACEÆ.

CROCUS. Saffron. The stigma and part of the style, dried, of Crocus sativus; native of Greece, and Asia Minor; imported from Spain, France, and Italy.

Description. The stigma, and part of the style of the flower, form a thin filament, broad at one end, tripartite, and of an orange-red colour. Dried carefully, without further preparation, it forms *hay saffron*, and when packed and pressed into parcels, *cake saffron.*

Prop. & Comp. Saffron, moistened and pressed upon white paper, leaves an orange-coloured stain, and yields to water and alcohol an orange-red colouring matter called *polycroite*, changed to blue by oil of vitriol; the solution should not deposit any white or coloured powder. It also contains a *volatile oil.* When pressed between folds of white filtering paper it leaves no oily stain.

Off. Prep. **Tinctura Croci.** *Tincture of Saffron.* (Saffron, one ounce; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Saffron is also an ingredient of the decoction of aloes, pill of aloes and myrrh, aromatic powder of chalk, compound tincture of cinchona, ammoniated tincture of opium, and tincture of rhubarb.

Therapeutics. Saffron has a very slight stimulant action; it is rarely given alone, and its chief use in medicinal preparations is as a colouring agent. It is supposed to be useful in the treatment of the exanthemata, from its power of determining to the skin.

Dose. Of dried saffron, from 20 gr. upwards; of the tincture, ½ fl. drm. to 2 fl. drm.

Adulteration. Marigold and safflower petals are often found in saffron; also the stamens of the saffron. The so-called cake saffron now consists almost entirely of the safflower petals gummed together.

SMILACEÆ.

SARSÆ RADIX. Jamaica Sarsaparilla. The dried root of Smilax officinalis, Sarsaparilla. Native of Central America, imported from Jamaica.

Description. Sarsaparilla consists of the root-stock, with numerous roots attached, generally several feet long; these roots often give off secondary rootlets, which are themselves again finely subdivided; they are then said to be bearded. On transverse section, the roots are seen to consist of a cortex or rind, and a ligneous cord or meditullium enclosing the pith. According to the characters of these layers the Sarsaparillas of commerce have been classified by Dr. Pereira into the *non-mealy* and *mealy* varieties.

In the *non-mealy* varieties the cortex is deeply coloured and not mealy. Comparatively few starch granules can be detected under the microscope. The diameter of the meditullium is generally four or five times greater than that of the cortex. Oil of vitriol, applied to a transverse section, causes both cortex and wood to become of a dark red tint, and iodine shows but a small amount of starch. This division includes the *Jamaica,* the *Lima,* and the *true* or *lean Vera Cruz.*

Jamaica Sarsaparilla, the only official variety, occurs in bundles, from a foot to a foot and a half in length, with spirally twisted roots, more or less furrowed, varying in thickness, but not exceeding the diameter of a goose quill, several feet in length, folded, with numerous rootlets (*bearded*) of a reddish-brown colour. It has a mucilaginous, slightly bitter and acrid taste ; it yields much extractive matter when heated with water.

Lima Sarsaparilla occurs in bundles, about two or three feet long, of a greyish-brown colour ; it is derived from Smilax officinalis.

True Vera Cruz Sarsaparilla is not often found in commerce ; it is lean, unfolded, with few rootlets.

The *mealy* varieties include the *Honduras*, the *Brazilian*, and the *Caraccas*, or gouty Vera Cruz ; they are distinguished by the large amount of starch contained in the inner cortical layers, which are sometimes equal in thickness to the meditullium ; they break with a starchy fracture : the cortex is often cracked transversely, and sometimes falls off ; they have occasionally a swollen appearance, and are then named gouty. If a drop of sulphuric acid be added to a transverse section, the mealy coat is unchanged, the ligneous zone becomes dark purple, and when a solution of iodine is applied, the starchy layer becomes evident, from the formation of the blue iodide of starch.

Honduras Sarsaparilla occurs in bundles, about three feet long, composed of the folded roots, secured by a few circular twists ; of a dirty brown colour, with many lateral fibres. Its botanical origin is doubtful.

Brazilian or *Lisbon* Sarsaparilla occurs in bundles, from three to five feet long, composed of the unfolded roots, bound together very tightly by a flexible stem ; of a reddish-brown colour, with few rootlets. It comes from the Brazils, through Lisbon. It is probably derived from Smilax papyracea, and Smilax officinalis.

Caraccas, or *Gouty Vera Cruz* Sarsaparilla is found in bundles, two feet and a half long, and one foot broad, of a pale yellow colour. Derived from Smilax officinalis and syphilitica.

Prop. & Comp. Sarsaparilla contains a volatile oil, starch, ligneous fibre, and a peculiar crystallisable principle occurring as a white powder, *Smilacin*, of which little is known; soluble in hot water and alcohol, but almost insoluble in cold water; it colours sulphuric acid red.

Off. Prep. **Decoctum Sarsæ.** *Decoction of Sarsaparilla.* (Jamaica sarsaparilla, cut transversely, two ounces and a half; boiling distilled water, thirty fluid ounces. Reduce to a pint.)

Decoctum Sarsæ Compositum. *Compound Decoction of Sarsaparilla.* (Jamaica sarsaparilla, cut transversely, two ounces and a half; sassafras, in chips, guaiac wood turnings, dried liquorice root, bruised—of each a quarter of an ounce; mezereon, sixty grains; boiling distilled water, thirty fluid ounces. Reduce to a pint.)

Extractum Sarsæ Liquidum. *Liquid Extract of Sarsaparilla.* (Jamaica sarsaparilla, in fine powder, forty ounces; proof spirit, two pints; sugar, five ounces; distilled water, twelve pints. Macerate the sarsaparilla with the spirit for ten days, then press out twenty fluid ounces of liquor. Mix the pressed residue with the water, and macerate at 160° F. (71°·1 C.) for sixteen hours, then strain and press out the liquid, dissolve the sugar in this, and evaporate in a water-bath to about eighteen fluid ounces. Mix the two liquids, and make up the volume to forty fluid ounces by the addition of distilled water.)

Therapeutics. Very little that is definite can be stated with regard to the action of sarsaparilla upon the animal economy; it is supposed to be diaphoretic, diuretic, tonic, and alterative. It is extensively employed in the treatment of constitutional syphilis, but as it has been generally administered in combination with powerful remedies, it is difficult to ascertain how much influence this drug has had in the cure of the affection. By some practitioners sarsaparilla is regarded as a remedy of great value; by others as possessing but little power: as a rule it is more relied on by surgeons than physicians. Sarsaparilla has also been given in cachectic conditions of the habit depending upon other causes, as scrofula, &c.; in the form of the compound decoction, in which other stimulant sudorific agents are present, it is employed in chronic forms of rheumatism, gout, and skin diseases.

Dose. Of either decoction, 2 fl. oz. to 10 fl. oz.; of the liquid extract, 2 fl. drm. to 4 fl. drm.

Adulteration. Inferior kinds of sarsaparilla are substituted for the official Jamaica variety; these yield much less extractive matter; sometimes other substances are mixed with it, as dulcamara, &c., detected by the difference of structure.

LILIACEÆ.

SCILLA. Squill. The bulb of Urginea Scilla, divested of its dry membranous outer scales, sliced and dried; growing on the southern coasts of Europe bordering on the Mediterranean.

Description. The recent bulb is pear-shaped, varying in size from a man's fist upwards, and weighing from half a pound to four pounds. The outer scales are thin and membranous, brownish red or white; the inner thick, fleshy, white, and juicy. As met with in the shops, squill is generally in flattened or four-sided curved pieces, of a yellowish white or somewhat pinkish colour, consisting of transverse sections of the bulb.

Prop. & Comp. Squill has a disagreeably bitter taste; the pieces are brittle and easily pulverisable if very dry, but if exposed, they readily recover moisture and become tough and flexible. Squill yields its active constituents to water, acetic acid, and alcohol. It appears to contain an *acrid resin*, having very powerful medicinal properties; also a very *bitter principle*, *Scillitoxin*, together with sugar, mucilage, and citrate of calcium, which is found in the form of acicular crystals in the parenchyma of the bulb.

Off. Prep. **Acetum Scillæ.** *Vinegar of Squill.* (Squill, bruised, two and a half ounces; dilute acetic acid, a pint.)

Oxymel Scillæ. *Oxymel of Squill.* (Vinegar of squill, a pint; clarified honey, two pounds. Mix and evaporate to sp. gr. of 1·32.)

Pilula Scillæ Composita. *Compound Squill Pill.* (Squill, in powder, one ounce and a quarter; ginger, ammoniacum, hard soap, each one ounce; treacle, by weight, two ounces, or a sufficiency.)

Pilula Ipecacuanhæ cum Scilla. *Pill of Ipecacuanha with Squill.* (Compound powder of ipecacuanha, three ounces; squill and ammoniacum in powder, of each one ounce; treacle, a sufficiency.) Twenty-three grains of the pill mass contain about one grain of opium.

Syrupus Scillæ. *Syrup of Squill.* (Vinegar of squill, a pint; refined sugar, two and a half pounds.)

Tinctura Scillæ. *Tincture of Squill.* (Squill, bruised, two ounces and a half; proof spirit, one pint. Prepared by maceration and percolation.)

Therapeutics. Squill acts as a stimulant expectorant and diuretic, in larger doses it produces vomiting and purging. It increases the secretions of the bronchial mucous membrane, and also aids the expectoration of mucus, when abundant and viscid. Its stimulating and acrid properties render it inadmissible in cases of an active inflammatory nature. As a diuretic, it is generally given with a mercurial, or with digitalis. It is seldom given as an emetic, as it produces distressing nausea, and sometimes hypercatharsis. As an expectorant, ipecacuanha and ammoniacum are frequently conjoined with it.

Dose. Of the powdered squills, 1 gr. to 3 gr.; of vinegar of squill, 15 min. to 40 min.; of oxymel of squill, ½ fl. drm. to 1 fl. drm.; of compound squill pill, or of the pill of squill and ipecacuanha, 5 gr. to 10 gr.; of syrup of squill, ½ fl. drm. to 1 fl. drm.; of tincture of squill, 10 min. to 30 min.

ALOE BARBADENSIS. Barbadoes Aloes. Inspissated juice of the cut leaf of Aloe vulgaris, the common aloe, growing in the East and West Indies; imported from Barbadoes and the Dutch West Indian Islands, and known in commerce as Barbadoes and Curaçoa Aloes.

ALOE SOCOTRINA. Socotrine Aloes. The juice of the cut leaf of Aloe Perryi, and probably other species; produced chiefly in Socotra, shipped to Europe by way of Bombay and Zanzibar, and known in commerce as Socotrine and Zanzibar Aloes.

ALOIN. Aloin. $C_{16}H_{18}O_7$. A crystalline substance extracted from aloes by solvents, and purified by recrystallisation.

Description. *Barbadoes* aloes has a dull appearance, and occurs in masses with a colour varying from deep reddish-brown or chocolate-brown to dark brown or almost black; very opaque, but in thin films translucent and of an orange-brown tint. The odour is extremely nauseous, especially when breathed upon; the taste is intensely bitter; it breaks with a dull conchoidal fracture; when powdered, it has a dull olive-yellow colour. The Curaçoa variety is commonly more glassy and translucent, and has a distinctive odour; it dissolves almost entirely in proof spirit; moistened with rectified spirit and examined under the microscope, it exhibits numerous crystals.

Socotrine Aloes occurs in reddish-brown masses, opaque or translucent at the edges; it breaks with a vitreous or resinous fracture, and sometimes possesses considerable transparency; the odour is fruity and by no means disagreeable, the taste very bitter; the colour of the powder is bright tawny reddish-brown; it dissolves almost entirely in proof spirit, and when moistened with rectified spirit and examined in a thin stratum under the microscope, it exhibits numerous crystals.

In other cases Socotrine aloes is more or less opaque and liver-coloured, and is then known as hepatic aloes.

Specimens of *Aloin* obtained from different varieties of aloes differ slightly, but their medicinal properties are similar. Aloin usually occurs in tufts of acicular crystals, yellow, inodorous, and having the taste of aloes.

Prop. & Comp. Nearly all the varieties of aloes yield *Aloin*, which is sparingly soluble in cold water, more so in cold rectified spirit, freely soluble in the hot fluids, and insoluble in ether. Aloin is not readily altered in acidified or neutral solutions, but is rapidly altered in alkaline fluids. In addition to this principle, aloes contains a substance which has been named *resin*, differing however from ordinary resins in being soluble in boiling water; it is probably formed from aloin by the action of the air; when aloes is acted upon by nitric acid several crystalline compounds are obtained, as *Polychromic*, *Chrysammic*, and *Chrysolepic* acids, the solutions of which are strongly red and purple in colour. A peculiar acid, named *Aloetic acid*, which strikes olive-brown with the persalts of iron, also results from the action of cold fuming nitric acid upon aloin.

Off. Prep.—Of Barbadoes or Socotrine Aloes: **Enema Aloes.** *Enema of Aloes.* (Aloes, forty grains; carbonate of potassium, fifteen grains; mucilage of starch, ten fluid ounces.)

Of Barbadoes Aloes:

Extractum Aloes Barbadensis. *Extract of Barbadoes Aloes.* (Barbadoes aloes, in small fragments, a pound; boiling distilled water, one gallon. Made by exhausting the aloes with water, and evaporating the solution to dryness.)

Pilula Aloes Barbadensis. *Pill of Barbadoes Aloes.* (Barbadoes aloes in powder, two ounces; hard soap in powder, one ounce; oil of caraway, one fluid drachm; confection of roses, one ounce.)

Pilula Aloes et Ferri. *Pill of Aloes and Iron.* (Sulphate of iron, one ounce and a half; Barbadoes aloes in powder, two ounces; compound powder of cinnamon, three ounces; confection of roses, four ounces.)

Barbadoes aloes is also contained in pilula cambogiæ composita, pilula colocynthidis composita, and pilula colocynthidis et hyoscyami.

Of Socotrine Aloes:

Decoctum Aloes Compositum. *Compound Decoction of Aloes.* (Extract of Socotrine aloes, half an ounce; myrrh, saffron, carbonate of potassium, of each a quarter of an ounce; extract of liquorice, two ounces; compound tincture of cardamoms, fifteen fluid ounces; distilled water, a sufficiency to make fifty fluid ounces.) This preparation contains four grains of extract of aloes in one fluid ounce.

Extractum Aloes Socotrinæ. *Extract of Socotrine Aloes.* (Prepared in the same way as the extract of Barbadoes aloes.)

Pilula Aloes Socotrinæ. *Pill of Socotrine Aloes.* (Socotrine aloes in powder, two ounces; hard soap in powder, one ounce; volatile oil of nutmeg, one fluid drachm; confection of roses, one ounce.)

Pilula Aloes et Asafœtidæ. *Pill of Aloes and Asafœtida.* (Socotrine aloes in powder, asafœtida, hard soap, in powder, of each one ounce; confection of roses, about one ounce, or a sufficiency.)

Pilula Aloes et Myrrhæ. *Pill of Aloes and Myrrh.* (Socotrine aloes, two ounces; myrrh, one ounce; saffron, dried, half an ounce; treacle, one ounce; glycerine, a sufficiency.)

Tinctura Aloes. *Tincture of Aloes.* (Socotrine aloes, in coarse powder, half an ounce; extract of liquorice, one ounce and a half; proof spirit to make twenty fluid ounces.)

Vinum Aloes. *Wine of Aloes.* (Socotrine aloes, one ounce and a half; cardamom seeds, bruised, eighty grains; ginger, in coarse powder, eighty grains; sherry, two pints. By maceration.)

Socotrine aloes is also contained in extractum colocynthidis compositum, pilula rhei composita, and tinctura benzoini composita.

Therapeutics. Aloes when taken internally, acts as a purgative, affecting chiefly the lower portion of the intestinal canal, sometimes causing hæmorrhoids. The secretions of the tube are but little augmented, and the action is slow in character; by some observers the bile is asserted to be increased in quantity, and the drug appears to influence the whole portal circulation. Emmenagogue effects also are frequently produced. Upon the upper part of the canal, tonic and stomachic effects seem to be induced when small doses of aloes are administered.

Aloetic preparations are given in cases of habitual constipation, and are of great value from the little disposition they possess to produce a subsequent confined state of the bowels.

In chronic dyspepsia they frequently form a portion of the habitual pill, and may be combined with tonics and stomachics. They are often used as adjuncts to other purgatives, as colocynth, rhubarb, scammony, &c., when full cathartic effects are desired, and when there is a defective secretion of bile.

Combined with iron and myrrh, aloes is frequently given in amenorrhœa, connected with defective action of the pelvic organs, and an anæmic condition of the blood.

Aloes should be avoided in cases where there is much tendency to hæmorrhoids, or when inflammatory action is present in the abdominal organs.

Aloin is said to possess the purgative properties of aloes, and to cause less griping.

There appears to be but little difference of action between the official species of aloes, although on this point there is considerable discrepancy of opinion; some physicians think that the extract of Barbadoes aloes is more efficient than the same amount of extract of the Socotrine variety.

Aloes frequently induces much griping, especially if administered alone, and this unpleasant property is often ascribed to the resinous portion of the drug. The author made numerous observations on this point in 1860, and found that where the extract and the resinous residue were administered to patients, the extract proved far more active as a purgative than the resin, and also caused much griping: in the same subject the resin caused little or no griping; it often proved almost inert. Dr. F. Farre made similar observations at the same time, and with the same results.

Dose. Of either Barbadoes or Socotrine aloes, in powder, 2 gr. to 6 gr.; of aloin, ½ gr. to 2 gr.; of the extract of aloes, 2 gr. to 6 gr.; of the compound decoction of aloes, ½ fl. oz. to 2 fl. oz.; all pills containing aloes may be given in doses of 5 gr. to 10 gr.; of the tincture of aloes, 1 fl. drm. to 2 fl. drm.; of the wine of aloes, 1 fl. drm. to 2 fl. drm.

Smaller doses may be given as adjuncts to other purgatives, or when the drug is given in combination with stomachics.

MELANTHACEÆ.

VERATRI VIRIDIS RHIZOMA. Green Hellebore Rhizome. The dried rhizome and rootlets of Veratrum viride; American or Green Hellebore; called also Swamp Hellebore and Indian Poke; growing in the marshy and swampy districts of the United States and Canada.

Description. The rhizome is met with entire, or sliced transversely or longitudinally, and either with or without attached rootlets. When entire it is from one to two inches or more in length, and three-quarters of an inch or more in diameter, conical, truncated at the apex, dark brown externally, whitish within. The upper end usually bears concentrically arranged remains of leaves; shrivelled yellowish-white rootlets may be given off from the rhizome, or, if they are detached, corresponding scars are left. Green Hellebore is inodorous, but excites sneezing when powdered; taste bitter and very acrid.

Prop. & Comp. This rhizome is stated to contain several alkaloids, *Jervine, Pseudojervine, Cevadine,* a small amount of *Rubijervine* and traces of *Veratrine* and *Veratralbine. Veratroidine* was formerly regarded as an alkaloid, but it probably consists of rubijervine and resin. Besides these, it contains a *resin,* which is physiologically inert.

Off. Prep. **Tinctura Veratri Viridis.** *Tincture of Green Hellebore.* (Green hellebore rhizome, four ounces; rectified spirit, a pint. Macerate and percolate.)

Therapeutics. Veratrum viride causes topical irritation, as shown by dryness of the fauces and vomiting; after absorption it produces extreme depression of the heart, arterial and nervous systems. Veratrum viride is asserted to be a valuable agent in controlling the vascular system in cases of inflammatory disease, and especially in rheumatic fever, gout, and allied affections. The depression and slowness of the pulse appear to be characteristic symptoms of its action.

The researches of Dr. H. C. Wood led to the following conclusions:—*Jervine* lessens the functions of the spinal cord, of the medulla, and of the cardiac ganglia, and at the same time produces convulsions by irritation of the motor centres in the brain; the voluntary muscles and motor nerves are little affected, if at all. *Veratroidine* differs from *jervine* in always causing vomiting and purging, and in producing less violent convulsions. It stimulates the vagus centre and vaso-motor centre, and paralyses the respiratory centre. Under its influence the pulse is at first slower, and the blood-pressure is lower, but later the pulse becomes very rapid, and owing to the asphyxiated condition of the patient the blood-pressure rises greatly.

The effect of this drug as a cardiac depressant, has been somewhat extravagantly vaunted by some American practitioners; a careful and impartial clinical study of its therapeutic value is a desideratum.

Dose. Of the powdered rhizome, 1 gr. to 3 gr. or more; of the tincture, 5 min. to 20 min.; an extract is sometimes made from the fresh juice, of which the dose is $\frac{1}{4}$ gr. to $\frac{3}{4}$ gr. or more.

This drug should be used with caution, and any symptom of sudden and marked depression carefully watched for.

SABADILLA. Cevadilla. The dried ripe seeds of Schœnocaulon officinale (Asagræa officinalis); imported from Mexico.

VERATRINA. Veratrine. An alkaloid, or mixture of alkaloids, obtained from Cevadilla ; not quite pure.

Description. The seeds are about a quarter of an inch long, blackish-brown, shining, narrow, fusiform or somewhat scimitar-shaped, slightly winged, with an intensely bitter acrid taste. The seeds are sometimes imported in their pericarps, or mixed with them, these should be rejected. *Veratrine* usually occurs in the form of a pale grey, amorphous powder.

Prop. & Comp. The cevadilla fruit owes its virtues to the alkaloid *veratrine*, which is insoluble in water, soluble in ether, in alcohol, and in dilute acids, leaving traces of an insoluble brown resinoid matter. It has no odour, but it is powerfully irritating to the nostrils ; it has a strongly and persistently bitter and highly acrid taste. Brought in contact with strong sulphuric acid, it assumes an intense red colour, which exhibits a green fluorescence by reflected light ; with nitric acid it forms a yellow solution. The veratrine of commerce contains another principle, *sabadilline*, insoluble in ether, thus differing from veratrine ; it does not excite sneezing. Gallic acid appears to be united with veratrine in the cevadilla fruit.

Veratrine is ordered to be made by macerating cevadilla with boiling distilled water, then drying and separating the seeds, which are ground in a coffee mill, and thoroughly exhausted with rectified spirit. The alcoholic solution is concentrated so long as no deposit forms, and then poured, when hot, into twelve times its bulk of cold distilled water. The precipitate of resin thus formed is removed by filtration, and washed ; and to the filtered liquid, which contains the veratrine in combination with gallic acid, ammonia is added in slight excess, which combines with the gallic acid, setting the insoluble veratrine free ; the precipitate of the latter is allowed completely to subside, then collected on a filter and washed ; while still moist, it is diffused through distilled water, and sufficient hydrochloric acid is added to make the fluid acid, when hydrochlorate of veratrine is formed. It is then decolorised with animal charcoal, filtered, re-precipitated with ammonia, the precipitate washed on a filter till the washings cease to be affected by a solution of nitrate of silver acidulated with nitric acid, and finally dried by imbibition with filtering paper, and then by the application of warmth.

Off. Prep.—Of Veratrine. **Unguentum Veratrinæ.** *Ointment of Veratrine.* (Veratrine, eight grains; hard paraffin, a quarter of an ounce; soft paraffin, three quarters of an ounce ; olive oil, a fluid drachm.)

Therapeutics. When brought in contact with the mucous lining of the nasal passages, veratrine causes violent sneezing. Applied to the unbroken skin, it excites a sensation of warmth and pricking. Taken internally, it causes nausea and vomiting, diarrhœa, formication in the extremities; the pulse is rendered weak, slow, and ultimately irregular; the temperature falls; there is muscular weakness and twitching; finally convulsions ensue, collapse and death.

The action of veratrine upon the heart is peculiar; its first effect is a transient quickening, ascribed by Bezold to stimulation of the motor ganglia; this is followed by a retardation due to the influence of the alkaloid upon the vagi. Veratrine has an immediate effect on the voluntary muscles; the tetanoid spasms which it causes are not arrested by separating the muscles from their connection with the spinal cord (differing in this respect from the spasms due to strychnine). It does not appear to exert any direct influence on the brain or cord.

Veratrine has been employed medicinally in acute febrile affections of a sthenic type (erysipelas, lobular pneumonia) to reduce the pulse and temperature; it is undoubtedly capable of producing this effect; but there is no evidence to show that the course of the disease is shortened, or that its issue is rendered more favourable; besides, the vomiting and purging caused by the drug are often very undesirable complications. It has also been used in acute rheumatism and gout; it does not exercise the specific influence of colchicum over the latter disease. Externally, the ointment has been found to relieve pain in neuralgia of the fifth nerve; it may be used as a substitute for aconite. It has also been recommended for pruritus.

Dose. Of veratrine $\frac{1}{70}$ gr. to $\frac{1}{16}$ gr. It should be exhibited with great care if used internally.

COLCHICI CORMUS. Colchicum Corm. The fresh corm of Colchicum autumnale, the Meadow Saffron, collected about the end of June; and the same stripped of its coat, sliced transversely, and dried at a temperature not exceeding 150° F. (65°·5 C.); a wild herb, indigenous.

COLCHICI SEMINA. Colchicum Seeds. The seeds, fully ripe, of Colchicum autumnale.

Description. The *corm* is about the size of a chestnut, and of a somewhat similar shape, being convex on one side, and flattened or slightly concave on the other, where it has a new corm in process of development. When fresh, it is solid and fleshy, with an external brown membranous coat, internally white, and yielding a milky juice on section. When dried and deprived of its outer coat, it is of an ash-grey colour; it is generally met with in transverse slices of a somewhat oval shape, about an eighth or a tenth of an inch thick, firm, flat, whitish, and amylaceous; one border convex, the other concave or slightly hollowed out. The taste is bitter and acrid; the fracture short. The *seeds* are spherical, slightly pointed at the hilum, about a tenth of an inch in diameter, externally of a reddish-brown colour, white within, very hard and difficult to powder.

Prop. & Comp. The corm, and also the seeds, contain fatty matters, gum, starch, lignin, and a crystalline principle, *Colchicine*, together with traces of veratrine.

Off. Prep.—Of the Corm:—

Extractum Colchici. *Extract of Colchicum.* (The expressed juice, heated to 212° F. (100° C.), strained and evaporated at a temperature not exceeding 160° F. (71°·1 C.), to the proper consistence for making pills.)

Extractum Colchici Aceticum. *Acetic Extract of Colchicum.* (As the above, with the use of six fluid ounces of acetic acid to seven pounds of corms deprived of their coats. The fluid is evaporated to the consistence of a soft extract.)

Vinum Colchici. *Wine of Colchicum.* (Colchicum corm, sliced, dried, and in coarse powder, four ounces; sherry, twenty fluid ounces. Prepared by maceration.)

Of the Seeds:—

Tinctura Colchici Seminum. *Tincture of Colchicum Seeds.* (Colchicum seeds bruised, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Therapeutics. Colchicum in medicinal doses produces increased action of some of the secreting organs; bile appears to be thrown out in larger quantities, and the fæces become more coloured, and often give evidence of containing the real organic portion of that fluid as well as the colouring matter.

The urine is sometimes increased in quantity, and it is generally asserted that urea and uric acid are also augmented, but from numerous trials the author is inclined to question the accuracy of the last assertion; at times also, the action of the skin is increased.

The heart's action is diminished, and in some patients, intermission of the pulse is produced by the drug; in large doses, vomiting and purging ensue, accompanied by intense prostration.

In gout, when colchicum is administered to patients suffering from inflammation and pain, these symptoms are usually greatly relieved, and to such an extent does this occur, that the drug is regarded as almost a specific in an acute attack of the disease. Colchicum is employed very extensively in the different forms of gout; sometimes given in doses too small to induce purging, at other times in larger doses to act freely on the bowels; it certainly possesses a power of controlling the pain and inflammation in gout, independent of all evident increase of the secretions; in what way this effect is produced is at present unknown.

In acute rheumatism and other inflammatory affections, colchicum often relieves, probably rather by its controlling power over the heart's action, than by any specific effect of the medicine.

As a cholagogue, colchicum may also be very advantageously given combined with other purgatives, in cases of imperfect action of the liver; and it may be often substituted for mercurials. It has occasionally been prescribed in dropsies and in skin affections.

Some practitioners prefer the seeds, some the corm, some the flowers; it appears however most probable, that the same principle gives activity to all parts of the plant, and that any difference of action is in degree, rather than in character.

Dose. Of powdered colchicum corm, 2 gr. to 8 gr.; of extract of colchicum, ½ gr. to 2 gr.; of acetic extract of colchicum, ½ gr. to 2 gr.; of tincture of colchicum, 10 min. to 30 min.; of wine of colchicum, 10 min. to 30 min.

GRAMINACEÆ.

FARINA TRITICI. Wheaten Flour. The grain of Triticum sativum, Common Wheat, ground and sifted; growing in Europe, and cultivated also over the greater part of the civilised world.

MICA PANIS. Crumb of Bread. The soft part of bread made with wheaten flour.

AMYLUM. Starch. Starch procured from the grains of Triticum sativum, Wheat; Zea Mays, Maize; and Oryza sativa, Rice.

Description. These substances are too well known to need description. Starch occurs in white columnar masses, which become blue with solution of iodine.

Prop. & Comp. Flour consists chiefly of *starch* and *gluten*, together with gum, sugar, mucilage, and water. If kneaded under a stream of water, the starch is washed away, and a tenacious mass left behind, which consists of gluten, constituting from 10 to 12 per cent. of the flour. *Gluten* prepared in the above manner consists of two different substances; one of which is soluble in alcohol, pure gluten, or vegetable fibrin; the other, insoluble in that menstruum, known as vegetable albumen. *Starch* occurs as irregular, angular or columnar masses, or as a white granular powder, without odour or taste; under the microscope it is found to consist of grains of varying size, having more or less of a circular outline and flattened, the hilum in the centre being surrounded by a series of concentric rings reaching sometimes nearly to the circumference. Each grain is formed of a thin external albuminous coat, containing a substance which is termed *amidin* or gelatinous starch. When rubbed in a Wedgwood mortar with a little cold distilled water, it is neither acid nor alkaline to test-paper, and the filtered liquid does not become blue on the addition of a solution of iodine. Mixed with boiling water and cooled, it gives a blue colour with iodine. When examined under the microscope, *wheat* starch is seen to consist of a mixture of large and small granules, lenticular in form, and marked with faint concentric striæ surrounding a nearly central hilum; in *maize* starch the granules are more uniform in size, frequently polygonal, somewhat smaller than the large granules of wheat starch, and have a very distinct hilum but no evident concentric striæ; in *rice* starch the granules are extremely minute, nearly uniform in size, polygonal, with a small hilum and no striæ. By heating for some time with dilute sulphuric acid, starch is first converted into *dextrin*, and afterwards into *glucose* or grape sugar. Strong nitric acid changes starch into oxalic acid.

Off. Prep. Of Starch. **Glycerinum Amyli.** *Glycerine of Starch.* (Starch, one ounce; glycerine, five fluid ounces; distilled water, three fluid ounces. Stir them together in a porcelain dish, and apply heat, stirring constantly, until the starch particles are completely broken and a translucent jelly is formed.)

Mucilago Amyli. *Mucilage of Starch.* (Starch, one hundred and twenty grains; distilled water, ten fluid ounces. Prepared by trituration and boiling.)

Wheaten flour is contained in the yeast poultice; crumb of bread in the charcoal poultice; starch enters into the composition of the compound tragacanth powder, and of the suppositories of tannic acid, and of morphine with soap. Glycerine of starch is used in the suppositories (with soap) of carbolic acid, tannic acid, and morphine. Mucilage of starch occurs as a vehicle in most of the official enemata.

Therapeutics. In medicine *flour* is chiefly used in the form of bread crumb (mica panis), for giving consistence to pills; it is also employed as an emollient cataplasm. *Starch* is a mild nutritive demulcent; in conjunction with glycerine it forms a useful sheathing compound in cases of chilblains and roughness of the skin.

HORDEUM DECORTICATUM. Pearl Barley. The seeds of Hordeum distichon with their husks removed; cultivated in Britain.

Description. Chiefly seen in the shops in the form of pearl barley, white, rounded, retaining a trace of the longitudinal furrow. It consists of the seeds decorticated and rounded in a mill.

Prop. & Comp. It contains *gluten*, *starch*, gum, and saccharine matters.

Off. Prep. **Decoctum Hordei.** *Decoction of Barley.* (Pearl barley, two ounces; boiling distilled water, thirty fluid ounces. Prepared by washing the barley well in cold water, rejecting the washings; and subsequent decoction to about one pint.)

Therapeutics. Used in medicine in the form of decoction as a mild nutritive and demulcent drink.

Dose. Of the decoction, 1 fl. oz. to 4 fl. oz.

ERGOTA. Ergot. The sclerotium (compact mycelium or spawn) of Claviceps purpurea, produced within the pales, and replacing the grain, of the common rye, Secale cereale.

Description. Ergot occurs in grains, varying in length from one-third of an inch to an inch and a half, and in breadth in the same proportion; somewhat triangular in form, curved, tapering towards the ends, furrowed on two sides, but more especially on that which is concave, of a purple or brown colour, covered more or less with a bloom; moderately brittle; fracture short, exhibiting a white, or pinkish interior; odour faint, but in large quantities, strong and peculiar, more especially if the powder is triturated with potash; taste mawkish and rancid.

The healthy grain of rye consists of the seed-coat, composed of outer and inner layers, and the cells, containing gluten; and next, the cells of albumen, containing starch. In the ergotised grain, the seed-coat and gluten-cells are replaced by a layer of dark cells—the large cells of the albumen by the small cells of the ergot, and the starch grains of the albumen-cells by drops of oil. The bloom consists of the sporidia of the fungus.

The ergot is liable to be fed on by a species of acarus, which sometimes destroys the whole interior, leaving only the outer shell and its own excrementitial matter.

Prop. & Comp. Ergot contains a large quantity of fixed oil, about 35 per cent.; this was at first thought to be the active principle; subsequent researches have shown however that the fixed oil, when obtained by expression, is inactive, and it would seem that the active principle is extracted with the oil, and remains dissolved in it, but that the oil itself is not that principle. A peculiar reddish-brown substance having active properties has been named *Ergotin;* it is soluble in water, forming a red solution, and it has a strong bitter taste. It is stated that ergotin constitutes about 15 per cent. of the ergotised grain. Recent researches appear to prove that ergot contains at least three active principles, namely, *ergotinic acid, sphacelinic acid,* and an alkaloid *cornutine.* By distillation of ergot with potash, trimethylamin, $(CH_3)_3N$, has been procured, a substance having the peculiar odour of herring pickle. Ergot yields its virtues to alcohol and water.

Off. Prep. **Extractum Ergotæ Liquidum.** *Liquid Extract of Ergot.* (Ergot, crushed, one pound; distilled water, six pints; rectified spirit, six fluid ounces. Digest the ergot in four pints of water for twelve hours. Draw off the infusion and repeat the digestion with the remainder of the water. Press out, strain and evaporate the liquors by the heat of a water-bath to eleven fluid ounces; when cold, add the spirit. Allow it to stand for an hour to coagulate, then filter. The product should measure sixteen fluid ounces.)

Infusum Ergotæ. *Infusion of Ergot.* (Ergot, crushed, a quarter of an ounce; boiling distilled water, ten fluid ounces.)

Tinctura Ergotæ. *Tincture of Ergot.* (Ergot, finely comminuted, five ounces; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Ergotinum. *Ergotin. Purified Extract, commonly called Ergotine or Bonjean's Ergotine.* (Liquid extract of ergot, four fluid ounces; rectified spirit, four fluid ounces. Evaporate the liquid extract by a water-bath to a syrupy consistence, and when cold mix with the spirit. Let it stand for half an hour, then filter, and evaporate the filtered liquid to the consistence of a soft extract.)

Of Ergotin.

Injectio Ergotini Hypodermica. *Hypodermic Injection of Ergotin.* (Ergotin, one hundred grains; camphor water, two hundred fluid grains. Dissolve by stirring.) The solution should be made as required for use.

Therapeutics. It has been experimentally proved that ergot causes contraction of the minute arteries by acting on their muscular walls, and thus increases the systemic blood-pressure. Previous division of the vaso-motor nerves does not prevent its action on the arterioles. When injected into the jugular vein it causes contraction of the pulmonary arterioles and thereby suddenly lowers the blood-pressure in the systemic arteries. It also exerts a peculiar influence on the uterus, probably through the spinal cord, causing powerful contractions, especially when the patient is in a pregnant state. When taken for a long period in small quantities, as in the form of bread made from ergotised grain, it produces a species of gangrene, resembling gangrena senilis, probably due to its causing obstruction to the blood supply by diminishing the calibre of the vessels. In large doses it induces nausea, vomiting, delirium, stupor, and even death. Its action is said to diminish the frequency and fulness of the pulse. It is most frequently employed to cause contraction of the uterus in cases of labour, and the contractions induced by it differ from the natural ones in being continued, instead of alternating with relaxation. In hæmorrhage after delivery it is especially indicated, and it is also of great value in menorrhagia, leucorrhœa, and sometimes in amenorrhœa, when depending on a torpid condition of the uterus rather than on anæmia. Moreover, it is a valuable means of checking hæmorrhage, whether from the lungs or bowels. Ergot has been given in many other diseases, as in paraplegia. It has been recommended in cases of constipation due to atony of the muscular wall of the intestine. Ergotin has been administered subcutaneously in order to promote the expulsion of intra-uterine submucous fibroids. It appears to cause considerable local irritation when given in this way, unless injected deeply into a muscle.

Dose. Of the liquid extract, 10 min. to 30 min.; of the infusion 1 fl. oz. to 2 fl. oz.; of the tincture, 5 min. to 30 min.; of the powder, 20 gr. to 30 gr. (infused in boiling water for about twenty minutes, and both infusion and dregs taken). Of ergotin, 2 gr. to 5 gr.; of the hypodermic injection of ergotin (by subcutaneous injection), 3 min. to 10 min.

SACCHARUM PURIFICATUM. Refined sugar. $C_{12}H_{22}O_{11}$. The purified crystalline juice prepared from the stem of Saccharum officinarum; cultivated in the West Indies and other tropical climates.

Description. White or lump sugar is too familiar as an article of domestic economy to receive detailed description. It occurs in compact crystalline conical loaves, snow white, dry, scentless, and intensely and purely sweet.

Prop. & Comp. The mother liquor from which the sugar is crystallised is molasses or treacle; the crystalline portion is clarified and refined in a manner the description of which would occupy too much space in a work of the present size. *Cane sugar* has the formula ($C_{12}H_{22}O_{11}$); it is soluble in half its weight of cold water, and in a much less quantity of hot; a very strong and viscid solution is called syrup. The aqueous solution should yield no red or yellow precipitate, or scarcely a trace, on being heated to near the boiling point of water for a short time with a little solution of sulphate of copper and excess of solution of potash; this test shows the absence of grape sugar. Carefully crystallised from a strong solution with the addition of spirit, it forms oblique four-sided prisms, *sugar candy*. Heated to 365° F. (185° C.), it melts, forming a viscid liquid, which when suddenly cooled, solidifies into an amorphous transparent substance, called *barley sugar*. It is less soluble in water than grape sugar, and readily converted into that substance by the action of weak acids, or by fermentation.

Off. Prep. **Syrupus.** *Syrup.* (Refined sugar, five pounds; distilled water, forty ounces. The sp. gr. should be 1·33.)

Sugar is used in the formation of the other syrups, of all the lozenges and in various other preparations of the Pharmacopœia.

Therapeutics. Sugar is demulcent; its sweet taste renders it useful to cover the unpleasant flavour of some remedies.

Dose. Of sugar or syrup, ad libitum.

Adulteration. Sugar is liable to contain some sulphate of calcium, and also lead, from its mode of purification; but the proportion of these substances is so minute as to be innocuous in the amount given medicinally, though not harmless when sugar is daily used in considerable quantities for domestic purposes.

THERIACA. Treacle. The uncrystallised residue of the refining of sugar.

Prop. & Comp. Treacle occurs as a golden thick fluid; very sweet; sp. gr. 1·40. It consists chiefly of sugar rendered uncrystallisable by heat: it is capable of fermentation with yeast, and then yields rum by distillation. It should be free from empyreumatic odour and taste.

Off. Prep. It is employed in the preparation of the tincture of chloroform and morphine, and in numerous official pills.

Therapeutics. Treacle acts as a slight laxative, in doses of a teaspoonful and upwards; it is often given in combination with sulphur.

CLASS III. ACOTYLEDONES.

SUB-CLASS I. ACROGENÆ.

FILICES.

FILIX MAS. Male Fern. The dried rhizome with the persistent bases of the petioles of Aspidium Filix-mas; Male Shield Fern; indigenous; it should be collected late in the autumn, divested of its scales, roots, and all dead portions, and carefully dried. It should not be used if more than a year old.

Description. The rhizome is three-quarters of an inch or an inch in diameter, but appears about two inches wide owing to the dense covering of hard persistent angular bases of the petioles. It is brown externally, yellowish within, with a disagreeable though slight odour, and a taste at first sweet, then bitter and nauseous.

Prop. & Comp. In addition to starch, gum, and salts, the male fern contains a *volatile oil*, *resin*, and a *fixed oil.* The active properties of the rhizome are soluble in ether; the ethereal extract referred to below, commonly known as the *oil of male fern*, is of a dark green colour; it contains the volatile and fixed oil, resin, and colouring matter in solution, and deposits crystals of filicic acid.

Off. Prep. **Extractum Filicis Liquidum.** *Liquid Extract of Male Fern.* (Male Fern, in coarse powder, two pounds; ether, eighty fluid ounces, or a sufficient quantity to exhaust the rhizome. Prepared by percolation and subsequent evaporation or distillation of the ether.)

Therapeutics. Male Fern is used as an anthelmintic, and acts apparently by killing the worms, and thus aiding their expulsion from the intestinal canal. Its use has been attended with much success in cases of tapeworm; it is said to be more useful against the Bothriocephalus latus than against the Tænia solium. It should be given on an empty stomach, and followed after an interval by some mild purgative. Upon the whole, liquid extract of male fern is perhaps the most valuable and most extensively employed of any anthelmintic in this country for the removal of tapeworms, and the small bulk of the dose is a great desideratum.

Dose. Of the powder, 60 gr. to 180 gr.; of the liquid extract, 15 min. to 30 min., or 1 fl. drm.

SUB-CLASS II. THALLOGENÆ.

LICHENES.

CETRARIA. Iceland Moss. Cetraria islandica; the entire lichen obtained in large quantities in Iceland, hence its name.

Description. Iceland moss consists of a foliaceous thallus, the lobes irregularly subdivided, fringed at the edges, crisp, cartilaginous, brownish-white, paler beneath, marked irregularly with small white depressed spots; almost odourless when dry, but when moistened with water it has a feeble seaweed-like odour; taste bitter and mucilaginous.

Prop. & Comp. The soluble portion is taken up by boiling water. The decoction thickens on cooling, and deposits a gelatinous matter; this when dried forms a semi-transparent mass, insoluble in cold water, alcohol or ether, but soluble in boiling water, and strikes blue with iodine; it is named *Lichenin.* Iceland moss contains also a *bitter principle,* soluble in alcohol and ether, and readily in alkaline solutions, but sparingly so in water; this is crystallisable, and has acid properties; it is called *cetraric acid* or *cetrarin.*

Off. Prep. **Decoctum Cetrariæ.** *Decoction of Iceland Moss.* (Iceland moss, well washed in cold water, one ounce; distilled water, twenty fluid ounces. Boil for ten minutes, strain, and pour distilled water over the strainer until the product measures a pint.)

Therapeutics. Iceland moss, deprived of its bitter principle, is used by the natives of Iceland and Lapland as an article of diet. The decoction is demulcent and slightly tonic. The cetraric acid is said to have been useful in intermittents as a substitute for quinine.

Dose. Of the decoction, 1 fl. oz. to 4 fl. oz.

ANIMAL KINGDOM.

CLASS, MAMMALIA.

RUMINANTIA.

MOSCHUS. Musk. The dried secretion from the follicles of the prepuce of Moschus moschiferus; native of Thibet and other parts of Central Asia. Imported from China and India.

Description. Musk is contained in a sac situated midway between the umbilicus and the prepuce. There are two chief varieties, the Chinese and the Russian. The sacs are about two inches in diameter, oval, hairy on one side, destitute of hair on the other, with bristle-like hairs concentrically arranged round a nearly central orifice; the Chinese sacs are the smallest, and the colour of the hairs darker than in the Russian variety. From 100 to 200 grains of musk are contained in each sac.

Prop. & Comp. Musk occurs in irregular, reddish-brown, or reddish-black, rather unctuous grains concreted together, soft to the touch; the odour is very strong, and diffuses itself over a great space; it contains ammonia, stearin, olein, cholesterin, various salts, small quantities of animal matter, and a *volatile oil*, thought by some to be in combination with ammonia; the proportion of these substances varies in different specimens, the active ingredients are soluble in alcohol and ether. Potash evolves ammonia and increases the peculiar odour.

Therapeutics. Musk is stimulant and antispasmodic, hence it has been used in hysteria and epilepsy, and also to rouse the system in cases of an adynamic type, as in typhoid pneumonia; its price however is almost prohibitive.

Dose. 5 gr. to 10 gr. and upwards.

Adulteration. On account of the high price of this drug, it is very liable to be adulterated; the sac containing the musk is often emptied of its contents, and filled up with a mixture of dried blood, with a greater or less proportion of true musk, and the sac carefully closed again: traces of the opening should be sought for. Sacs are manufactured from the scrotum or skin of the animal, and filled with a spurious mixture of musk, sand, and dried blood. The form and character of the bag should be noted, to see whether it differs from that described as genuine: the bag, if made from any other portion of the skin, may be recognised by the peculiar arrangement and microscopic character of the hairs; those of the true sac exhibit distinct, regular colour-cells, not found in the hairs of spurious pods.

SEVUM PRÆPARATUM. Prepared Suet. The internal fat of the abdomen of Ovis Aries, the Sheep; purified by melting and straining.

Description. Suet is the fat of the sheep chiefly obtained from the region of the kidney. It is prepared by melting at a gentle heat, and straining.

Prop. & Comp. Suet is white, soft, smooth, almost scentless, fusible at 103° F. (39°·4 C.); it is soluble in ether and boiling alcohol; it consists principally of *stearin* and *olein*. *Stearin* forms the chief portion of suet; it may be obtained crystallised from an ethereal solution, and then appears in small white shining plates; fuses at 143° F. (61°·7 C.), and when it solidifies, becomes opaque, and loses its crystalline character; it is soluble in alcohol and boiling ether, but insoluble in cold ether. *Olein* is the more liquid constituent of fat: it forms an oily fluid varying in quantity in the different varieties of fat, and generally holds in solution more or less of the solid constituents, from which it is separated completely with some difficulty. It exists in large quantity in the vegetable oils; it is more soluble in alcohol than either stearin or margarin. By the action of an alkali it is converted into glycerine and an oleate of the metal.

Off. Prep. Suet is employed in the preparation of cantharides plaster, and ointment of mercury.

Therapeutics. Suet is emollient, and is sometimes used as an addition to poultices.

LAC. Milk. The fresh milk of the cow, Bos Taurus. Used in the preparation of Scammony mixture.

SACCHARUM LACTIS. Sugar of Milk ($C_{12}H_{22}O_{11},H_2O$). Crystallised sugar, obtained from the whey of milk by evaporation.

Prep. The milk is coagulated, the curd separated, and after the whey has been evaporated to the crystallising point, pieces of wood or cord are introduced, upon which the milk sugar crystallises.

Prop. & Comp. Milk sugar occurs in cylindrical masses, about 2 inches in diameter and several inches in length, having an axis of cord or wood: the masses are composed of crystals, greyish white, translucent and hard; without odour, and with a slightly sweet taste; it is gritty in the mouth from the slight solubility of the sugar in the saliva. It is soluble in about seven parts of water at common temperatures, and in about one part of boiling water. Milk sugar, also termed Lactose, can be obtained in 4-sided prisms, terminated by 4-sided pyramids; its solution in water is much less sweet than that of cane sugar; it is not soluble in alcohol or ether. It is not subject to alcoholic fermentation, but milk is so from the prior slow conversion of the lactose into glucose. When milk ferments in contact with chalk, lactic acid is formed.

Off. Prep. Sugar of milk is contained in the compound powder of elaterin.

Therapeutics. It may be employed for the purpose of rubbing up powerful medicinal powders, as white bismuth, calomel, hydrochlorate of morphine, &c. Its action as a remedy is not readily appreciable. Probably milk sugar might be advantageously employed as a substitute for cane sugar in the diet of infants, being less irritating to the mucous membranes. Cow's milk diluted with water, with the addition of milk sugar, forms a good substitute for the milk of the human female.

Dose. Ad libitum.

FEL BOVINUM PURIFICATUM. Purified Ox Bile. The purified gall of Bos Taurus, the Ox.

Prep. Evaporate a pint of fresh ox bile to five fluid ounces, and mix it with half a pint of rectified spirit by agitation in a bottle. Set the mixture aside until the sediment subsides, decant the clear solution and filter the remainder, washing the filter and contents with a little more rectified spirit. Distil off most of the spirit from the mixed liquids, and evaporate the residue over a water-bath until it acquires a suitable consistence for making pills. By this process the mucus, which is always present in bile, is separated by the action of the spirit, and the preparation is rendered much less prone to putrefaction.

Prop. & Comp. A yellowish-green substance, somewhat firm and adhesive, having a faint and peculiar odour, and a taste at first very sweet, but soon becoming intensely bitter; it is soluble both in water and spirit. Bile, when separated from the mucus of the gall bladder, consists of two distinct portions, the *true biliary substance,* and the *colouring* and *fatty* matters. The former, a species of soap, is of a pale yellow colour, and is composed of two salts, *glycocholate* and *taurocholate of sodium.* Glycocholic acid ($C_{26}H_{43}NO_6$), when pure, as well as some of its salts, can be crystallised in white acicular needles. Taurocholic acid ($C_{26}H_{45}NSO_7$), the less abundant acid in ox bile, has not yet been obtained in a crystallised state. These acids, by the action of alkalies, become converted into cholic acid ($C_{24}H_{40}O_5$), and into glycin ($C_2H_5NO_2$) and taurin ($C_2H_7NSO_3$) respectively.

The green colouring matter is derived from the hæmatin of the red blood-corpuscles. The peculiar fat of bile is cholesterin, an alcohol ($C_{26}H_{44}O$), which readily crystallises, and forms the chief constituent of gall stones.

When bile has been purified by the above-mentioned process, its watery solution is not precipitated on the addition of rectified spirit. If a grain or two of bile in 1 fl. drm. of water, is treated with a drop of fresh syrup, and a little sulphuric acid is then cautiously added, it exhibits a play of colours from red to violet.

Therapeutics. Dried bile appears to act as a slight laxative on the alimentary canal when given in the ordinary medicinal doses; its use is supposed to be indicated in cases attended with deficient excretion of biliary matter, as shown by the pale colour of the alvine evacuations. It has been also said to be useful as a stomachic in some forms of functional dyspepsia, especially in cases where vomiting occurs after food. More clinical knowledge of its efficacy as a remedy is required before its value can be said to be fairly established.

Dose. Of purified bile, 5 gr. to 10 gr., or more, formed into pills, or given in small gelatin capsules. When the object is to affect the intestines rather than the stomach, the latter mode is preferable.

PEPSIN. Pepsin. A preparation of the mucous lining of the fresh and healthy stomach of the pig, sheep or calf.

Prep. The stomach of a recently killed animal is cut open and any adherent portions of food, &c., carefully removed, and the exposed mucous surface slightly and rapidly washed with cold water; the mucous membrane is then scraped with a blunt knife and the viscid pulp thus obtained spread out on a plate of glass or porcelain, and quickly dried at a temperature not exceeding 100° F. (37°·8 C.). The dried residue is powdered, and kept in a stoppered bottle. (This method was first proposed by Dr. Beale, who advised the exclusive use of the stomach of the pig; the preparation was formerly known as Bullock's pepsin.)

Boudault's pepsin (not official) is made by adding acetate of lead to an aqueous extract of the gastric mucous membrane. The pepsin is thrown down in combination with the metal, and the latter is then removed by sulphuretted hydrogen, which forms a sulphide of lead, while the pepsin is left in solution. A few drops of lactic acid are then added, and the solution evaporated until a gummy mass is left. This is powdered and mixed with dry starch.

Description. A light yellowish-brown powder with a faint but not unpleasant odour, and a slightly saline taste, without any indication of putrescence. Boudault's pepsin is a greyish-white powder, having a sour and often disagreeable odour.

Prop. & Comp. Pure pepsin has been shown by Brücke to differ from proteinaceous bodies in not yielding any precipitate with nitric acid, tannic acid, or mercuric chloride. The official pepsin is but little soluble in water or spirit. One hundred grains of hard-boiled white of egg passed through wire gauze of 36 meshes per linear inch, and made of No. 32 brass or copper wire, can be dissolved by two grains of pepsin in an ounce of distilled water, acidulated with five minims of hydrochloric acid, when they are digested and well stirred together for about thirty minutes at a temperature of 130° F. (54°·4 C.) Lactic, acetic, and other acids may be substituted for hydrochloric acid, but they are less effective; neutralisation suspends, without destroying, the action of the dilute acid solution.

Therapeutics. Pepsin has been given largely in cases of dyspepsia, especially when of the atonic kind, and has been asserted to be a very valuable remedy. It is found to be much more efficacious when given in conjunction with dilute hydrochloric acid, as its action is reduced in presence of peptones, and can be renewed by the addition of more dilute acid. In cases where anæmia has become so complete that the functions of the stomach are much deranged, the administration of pepsin in combination with iron tends to expedite recovery.

Some cases of spasmodic asthma have been treated with pepsin and dilute acid, when all other remedies have failed, and it has produced most beneficial results in palliating the symptoms; the researches of Dr. Pavy have proved that this disease is frequently dependent on gastric disturbance.

The author had a patient in extreme old age (above ninety), who suffered from vomiting or regurgitation after each meal, apparently arising simply from debility of the stomach; the administration of a few grains of pepsin mixed with the food, at once and entirely removed the symptom.

Dose. Of pepsin, 2 gr. to 5 gr. given with a meal. Boudault's pepsin is five times weaker than the official preparation. The pepsin of commerce varies very greatly in strength.

PACHYDERMATA.

ADEPS PRÆPARATUS. Prepared Lard. The prepared internal fat of the abdomen of Sus scrofa, the Hog.

Prep. From the perfectly fresh internal fat of the abdomen of the hog remove as much of the membranes as possible and suspend the fat so that it shall be freely exposed to the air for some hours; then cut the fat into small pieces, beat these in a mortar until reduced to a uniform mass in which the membranous vesicles are completely broken. Put the mass thus produced into a vessel surrounded by warm water, and apply a temperature not exceeding 130° F. (54°·4 C.), until the fat has melted and separated from the membranous matter; finally strain the melted fat through flannel.

Description. Lard needs but little description. It is a white, fatty substance, melting at about 100° F. (37°·8 C.).

Prop. & Comp. Consistence soft; it consists of a large quantity of *olein* (60 per cent.), with some *palmitin* and *stearin.* Palmitin is more soluble in cold ether than stearin. Properly prepared lard has no rancid odour, and dissolves entirely in ether. Distilled water in which it has been boiled, when cooled and filtered, gives no precipitate with nitrate of silver, and is not rendered blue by iodine, showing the absence of common salt and of starch.

Off. Prep. **Adeps Benzoatus.** *Benzoated Lard.* (Prepared lard, a pound; benzoin, in coarse powder, one hundred and forty grains. Melt the lard, add the benzoin, and strain.) The addition of the benzoin prevents the lard from becoming rancid and therefore irritating the skin.

Unguentum Simplex. *Simple Ointment.* (White wax, two ounces; benzoated lard, three ounces; almond oil, three fluid ounces.)

Lard, benzoated lard, and simple ointment are used in the preparation of other ointments. Lard is also contained in cantharides plaster.

Therapeutics. Lard is emollient, and is sometimes added to poultices to prevent their getting dry and hard.

CETACEA.

CETACEUM. Spermaceti. A concrete fatty substance, obtained, mixed with oil, from the head of the Sperm Whale, Physeter macrocephalus, *Linn.*, inhabiting the Pacific and Indian Oceans. It is separated from the oil by filtration and pressure, and afterwards purified.

Description. A concrete fatty substance, which is contained in numerous cells situated in the large cavity of the upper jaw of the sperm whale. The oily matter, on standing, separates into an oil and a peculiar substance, capable of crystallisation, spermaceti. The oil is poured off, and the spermaceti collected.

Spermaceti occurs in white glistening, translucent, crystalline cakes; it fuses at 111° to 122° F. (43°·9 to 50° C.). It has little odour or taste, can be reduced to powder by the addition of a little rectified spirit; is scarcely unctuous to the touch. It is combustible, insoluble in water, soluble in the fixed oils, ether, chloroform and boiling rectified spirit. By the action of an alkali it is broken up into palmitic acid, and a substance somewhat analogous to glycerine, called cetylic alcohol, or hydrate of cetyl ($C_{16}H_{33}HO$). Spermaceti may be regarded as palmitate of cetyl ($C_{16}H_{33},C_{16}H_{31}O,O$).

Off. Prep. **Unguentum Cetacei.** *Ointment of Spermaceti.* (Spermaceti, five ounces; white wax, two ounces; almond oil, twenty fluid ounces; benzoin, in coarse powder, half an ounce. Heat and stir frequently, and finally strain off the residual benzoin.

Spermaceti is also used in the preparation of the official blistering paper.

Therapeutics. Emollient; formerly given internally, but now chiefly used externally as an emollient application.

CLASS, AVES.

OVI ALBUMEN. Egg Albumen. The liquid white of the egg of Gallus Bankiva (var. domesticus).

OVI VITELLUS. Yolk of Egg.

Description. The *albumen*, or white of the egg, is a transparent, viscid, glairy liquid, miscible with water, coagulated by a heat of 160° F. (61°·2 C.), and then becoming opaque and of a milk-white colour; insoluble in water; by careful drying, at a moderate temperature, it may be solidified, retaining its transparency. It is coagulated by ether, in which respect it differs from the albumen of blood; coagulated also by corrosive sublimate.

The yolk of the egg is of a yellow colour, coagulated by heat; it yields a fixed oil by expression. It contains a peculiar albuminous principle, named *vitellin*, olein, margarin, cholesterin, together with salts of calcium, iron, &c., &c.

Off. Prep. The yolk of the egg is used in making the mixture of French brandy (egg flip).

Therapeutics. The albumen is recommended as an antidote in cases of poisoning by corrosive sublimate and sulphate of copper. The yolk is a mild, nutritious article of diet, and in the form of egg flip, is a useful and nutritious mixture, much employed in exhausted conditions of the system, when solid food cannot be taken. An astringent application is made by dissolving alum in white of egg; the albumen of the latter is coagulated, and in this form it is applied locally.

CLASS, PISCES.

OLEUM MORRHUÆ. Cod Liver Oil. The oil extracted from the fresh liver of the Cod, Gadus Morrhua, by steam heat not exceeding 180° F. (52°·2 C.).

Description. It is directed that the official oil shall consist of that extracted from the fresh liver of Gadus Morrhua, or Asellus major, the common Cod-fish; found in large quantities on the coasts of England, France, Iceland, and Norway, but especially off Newfoundland.

In commerce the oil is sometimes derived from the liver of other species of Gadus, mainly the Dorse, the Ling, the Coal Fish, the Pollack, and the Whiting.

The oil may be extracted from the livers by three different methods:—by exposing them to the sun to undergo a process of fermentation; by boiling them in water for some time; or by dividing the livers, and permitting the oil slowly to drain from them.

1. The oil is sometimes obtained by packing the livers in tall vats, furnished with three taps placed at different heights, and then exposed to the sun, to favour the separation of the oil. On opening the upper tap a pale oil is obtained; from the middle tap a light brown oil; and a darker brown yet transparent oil from the lower tap. The remaining mass of livers yields, by pressure and heat, a very dark and thick product, not fit for medicinal use, but employed by curriers, &c.

2. The second method of preparing the oil is by boiling the livers in water, and afterwards separating the oil from the surface, and filtering from it any albumen or cellular tissue.

3. The following is the method employed in the preparation of the best English cod-liver oil at Messrs. Bell and Co.'s establishment. The livers are collected daily, so that no trace of decomposition may have occurred, carefully examined, in order to remove all traces of blood and impurity, and to separate any inferior livers; they are then sliced, and exposed to a temperature not exceeding 180° F. (82°·2 C.), till all the oil has drained from them. This is filtered; afterwards exposed to a temperature of about 50° F. (10° C.), in order to congeal much of the solid fat (margarin), and again filtered and put into bottles well secured from the action of the air.

Three chief varieties of cod-liver oil occur in commerce, distinguished by their colour: the pale is that rendered official, prepared in England or elsewhere; besides which there are the light brown and the dark brown oil, from Norway, &c.

The difference in colour in the different oils depends upon the circumstances attending their preparation, such as the amount of heat employed, the state of freshness or putridity of the livers, the quantity of decomposed matter present in the oil, the length of exposure to the atmosphere, &c.

Prop. & Comp. The pale oil is almost colourless when first prepared, with a slight fishy odour, and a bland fish-like taste; sp. gr. from ·917 to ·920. The composition of the three varieties is essentially the same, but the darker contains more empyreumatic matter, and is much less agreeable to the taste. Cod-liver oil contains *olein*, *margarin*, various *biliary principles*, as the organic acids and colouring matter of bile; also phosphoric and sulphuric acid, with salts of calcium, magnesium, and iron; a peculiar substance, *gaduin*, very insoluble in ordinary menstrua, but soluble in sulphuric acid, and giving a blood-red colour to the solution; also *iodine* and *bromine.* The proportion of iodine is not more than ·05 per cent. When pure cod-liver oil, spread in a thin layer on a plate, has a drop of oil of vitriol added to it, a violet colour is produced, soon changing to a yellowish or brownish red, and rapidly spreading over the surface. This is probably due to the action of the acid on the biliary principles present in the oil.

Therapeutics. Cod-liver oil is a remedy which, at the present time, stands in very high estimation, nor does it appear probable that its reputation will be ephemeral; how it acts is still undetermined. When taken by patients who have become emaciated from any cause, and whose blood is impoverished, it frequently restores the flesh, and, from Dr. Theophilus Thompson's statements, it appears also to improve the richness of the blood. Under its influence, patients often increase greatly in weight, the increase exceeding many times the amount of oil consumed during the period. The oil also seems to possess the power of arresting the process of certain morbid actions, such as occur in phthisis, scrofula, rheumatoid arthritis and other low forms of inflammation; in fact, many anomalous diseased conditions become ameliorated under its influence. It has been supposed that the iodine and bromine contained in it might produce the beneficial results, but this idea is not tenable, for the effects of these latter remedies are very different from that of the oil; it would seem probable that it acts simply as an *oil*, and that it is superior to other oils on account of its being more readily assimilated. If the statement of Winkler prove correct—namely, that the olein differs from ordinary olein in not yielding *glycerine*—this may in part explain its value. It very seldom happens that patients cannot take the remedy, even when ordinary fatty substances disagree with them; it very rarely purges, except in cases where ulceration of the intestines is present. Cod-liver oil is employed extensively in the treatment of the different stages of phthisis, and various forms of scrofula; in chronic rheumatism and neuralgia; in chronic skin affections, and many other diseases of a low type accompanied by a cachectic condition of habit. It has been applied externally in some skin affections, and occasionally rubbed into the surface with the object of producing by this means its constitutional effects.

Dose. From 1 fl. drm. to 8 fl. drm.; taken upon water, milk, orange wine, ale, or porter, or made into an emulsion with lime-water. Some patients prefer it at the time of a meal, or immediately after food; it is often advantageously administered at bedtime.

Adulteration. Many oils have been mixed with cod-liver oil. The addition of the liver oil from other fish is not perhaps very important in a therapeutic point of view, and would be difficult or impossible to detect, as all of them give the test with sulphuric acid. When other oils, not of hepatic origin, are present, the sulphuric acid test is valuable, for the impure specimen either does not give the violet and red colours, or these become immediately mixed with, and obscured by, a dark brown substance from the charring of the oil; such is the case with whale or seal oil; also with olive and other vegetable oils.

TRIMETHYLAMIN. Trimethylamin. $(CH_3)_3N$. (Not official.)

Prop. & Prep. A colourless gas at ordinary temperatures, smelling strongly of rotten fish. It is readily absorbed by water, to which it imparts a strongly alkaline reaction. It may be obtained by distilling herring-brine with lime, or, if wanted in a state of purity, by heating the iodide of tetramethyl-ammonium. $(CH_3)_4NI=(CH_3)_3N+CH_3I$. Trimethylamin is isomeric with propylamin, C_3H_7,H_2N, for which it was mistaken when first introduced into practice. On account of its nauseous smell and taste, it is most suitably administered as a hydrochlorate.

The HYDROCHLORATE OF TRIMETHYLAMIN is a stable compound, in long needle-shaped crystals, very deliquescent, soluble in water and in alcohol. Its concentrated solutions are caustic. The salt has a slight fishy odour, and a pungent saline taste; when heated with a caustic alkali it emits the characteristic odour of rotten fish.

Therapeutics. It is stated to lower the temperature and pulse, even in health, occasionally causing diuresis. Large doses, administered to animals, cause sensory paralysis, drowsiness, convulsions, and death. Trimethylamin has been much employed in Russia and France as a remedy for acute rheumatism; the articular symptoms and the fever are said to be rapidly subdued by it, and the duration of the disease shortened. It has also been employed as a liniment. Further clinical investigation is needed however to substantiate its claims.

Dose. Of the hydrochlorate, 2 gr. to 3 gr. and more. It should be freely diluted with water and flavoured with tincture of orange-peel.

LEEDS SCHOOL OF MEDICINE

CLASS, INSECTA.

HYMENOPTERA.

MEL. Honey. A saccharine secretion deposited in the honeycomb by the Apis mellifica, *Linn.*, the Hive bee. British and imported.

Description. It is a viscid fluid, of a light yellow colour; the purest is obtained by allowing the honey to flow from the comb; it has a peculiar heavy odour and very sweet taste.

Prop. & Comp. It consists chiefly of grape sugar, $C_6H_{12}O_6$. The sp. gr. is 1·34: it has an aromatic odour dependent in part on the flowers from which it is obtained. It is often adulterated with starch; this adulteration is recognised by making a solution in hot water, allowing it to cool, and adding a solution of iodine; if starch is present, a blue colour is produced.

Off. Prep. **Mel Depuratum.** *Clarified Honey.* (Prepared by melting the honey in a water-bath, and while hot, straining through flannel previously moistened with warm water.) This removes organic impurities which render the honey liable to decomposition.

Oxymel. *Oxymel.* (Clarified honey, forty ounces; acetic acid, five fluid ounces; distilled water, five fluid ounces.)

Clarified honey is also used in the preparation of mel boracis, oxymel scillæ, confectio piperis, confectio scammonii, and confectio terebinthinæ.

Therapeutics. The action is much the same as that of sugar, but more laxative; it is generally used as a vehicle for other medicines.

Dose. Of honey, ad libitum; of oxymel, 1 fl. drm. to 2 fl. drm.

CERA FLAVA. Yellow Wax. The prepared Honey-comb of Apis mellifica, the Hive bee.

CERA ALBA. White Wax. Yellow wax bleached by exposure to moisture, air and light.

Description. When the honey has been separated from the comb, the remaining portion melted constitutes yellow wax. This when bleached forms white wax. The yellow occurs in large irregular masses, firm, breaking with a granular fracture, and having an agreeable honey-like odour; the white, in thin cakes, hard, nearly white, and translucent. Neither yellow nor white wax is unctuous to the touch.

Prop. & Comp. Yellow wax melts at 146° F. (63°·3 C.); the solidifying point is two or three degrees lower than the melting point; it should not yield more than three per cent. to cold rectified spirit, and should yield nothing to water or to a boiling solution of soda; the white wax should give the same results. Boiling water in which wax has been agitated, when cooled is not rendered blue by iodine.

Wax is separable by means of alcohol into three portions; *myricin*, almost insoluble in boiling alcohol; *cerotic acid*, soluble in boiling alcohol, but deposited when the liquid becomes cold; and *cerolein*, which remains in solution in cold alcohol. These substances exist in different proportions in different specimens of wax. Myricin, by the action of potash, may be converted into palmitic acid, and myricil alcohol.

Off. Prep.—Of White Wax. **Unguentum Simplex.** *Simple Ointment.* (White wax, two ounces; benzoated lard, three ounces; almond oil, three fluid ounces.)

White wax is also contained in blistering paper, and spermaceti ointment; as simple ointment it is employed in the preparation of many other official ointments.

Yellow wax is contained in phosphorus pill, and in several ointments and plasters of the Pharmacopœia.

Therapeutics. Demulcent, chiefly used to give consistence to some official preparations.

HEMIPTERA.

COCCUS. Cochineal. Coccus Cacti. The female Cochineal insect dried; reared in Mexico and Teneriffe on Opuntia cochinillifera, the Nopal plant, and other species of Opuntia.

Description. Of an oval form, convex on one side, flat and slightly concave on the other, about a fifth of an inch long, wrinkled transversely. One variety is of a purple-grey colour, due to the presence of a white powder upon the surface; this powder, when examined by the microscope, has the appearance of fine wool; the other, purple-black, and having but little of the white powder. The female insects are alone preserved; they are procured by brushing them off into bags, and killing them by immersion in hot water. The difference in the two varieties, the grey and the black grains, is that the grey is made up of the impregnated female just before she has hatched her eggs; the black, of the insect after the eggs have been laid and hatched.

Cochineal yields when crushed a dark red or puce-coloured powder. The grey insect becomes black when warmed before the fire. When ignited with free access of air, not much more than one per cent. of ash remains. When macerated in water no insoluble powder is separated.

Prop. & Comp. Cochineal consists of fatty matters, salts, &c., and a peculiar colouring matter called *carmine:* it occurs in the form of small grains of a purple-red colour, soluble in water and alcohol, sparingly so in ether. Acids increase the red colour, while alkalies render it violet. The colouring matter of carmine has been found to have acid properties, and has been called *carminic* acid ($C_{17}H_{18}O_{10}$).

Off. Prep. **Tinctura Cocci.** *Tincture of Cochineal.* (Cochineal, in powder, two ounces and a half; proof spirit, twenty fluid ounces. Prepared by maceration.)

Cochineal is contained in compound tincture of cardamoms and compound tincture of cinchona.

Therapeutics. Chiefly used as a colouring matter, much employed in the arts as a dye; it was formerly much esteemed in the treatment of pertussis.

Dose. Of the tincture, 30 min. to 1½ fl. drm.

Adulteration. Inferior cochineal is sometimes covered with some white powder, as talc, sulphate of barium, or carbonate of lead, to give it the appearance of the finer variety; also with bone black, to give it a black colour; adulterations which can be recognised by the above tests.

COLEOPTERA.

CANTHARIS. Cantharides. Cantharis vesicatoria; the Blister Beetle, or Spanish Fly; collected in Russia, Sicily, but chiefly in Hungary, and dried.

Description. The insect is from three quarters of an inch to an inch long, and a quarter of an inch broad; the elytra or wing-sheaths are long, of a fine green colour, and encase two thin brownish membranous wings. The flies swarm upon the trees about May or June, especially on the ash, lilac, and privet, and are brushed off by persons carefully masked, and received into linen cloths; they are killed by plunging them into boiling vinegar, and are then dried.

Prop. & Comp. The beetles have a strong disagreeable odour, and a burning taste; the powder is a greyish brown, containing shining green particles. In addition to oily and fatty matters, the beetles contain a crystallisable principle *Cantharidin*, to which their active properties are due. Cantharidin is insoluble in water, bisulphide of carbon, and nearly so in cold alcohol, but more soluble in chloroform, and strong acetic acid; soluble also in acetone and ether, and to some extent in oils and fats; as the active properties of the insect are partially yielded to water and cold alcohol, it would appear that the cantharidin exists in the beetle as a somewhat soluble compound. From 1000 parts of the flies about four parts of pure cantharidin have been procured; it may be sublimed without injury; it has very powerful vesicating properties.

Cantharidin is readily prepared by exhausting the powdered beetles with chloroform; distilling off the chloroform, and subsequently treating the extract with bisulphide of carbon, which dissolves the fatty matters, but leaves the cantharidin; this may be afterwards redissolved in chloroform and crystallised.

Off. Prep. **Acetum Cantharidis.** *Vinegar of Cantharides.* (Cantharides, bruised, two ounces; glacial acetic acid, two fluid ounces; acetic acid, eighteen fluid ounces, or a sufficiency. Digest the cantharides in the glacial acid mixed with thirteen ounces of acetic acid, at a temperature of 200° F. (93°·3 C.), for two hours; then percolate with the remainder of the acetic acid. Subject the contents of the percolator to pressure, filter the product, mix the liquids, and add enough acetic acid to make one pint.) Sp. gr. about 1·060. It contains two ounces to the pint.

Charta Epispastica. *Blistering Paper.* (White wax, four ounces; spermaceti, one ounce and a half; olive oil, two fluid ounces; resin, three quarters of an ounce; cantharides in powder, one ounce; Canada balsam, a quarter of an ounce; distilled water, six fluid ounces. Prepared by digesting the ingredients, except the Canada balsam, in a water-bath for two hours. Stir them constantly, then strain, and separate the plaster from the watery liquid. Mix the Canada balsam with the plaster melted in a shallow vessel, and pass strips of paper over the surface of the hot liquid, so that one surface of the paper shall receive a thin coating of plaster. It may be convenient to employ paper ruled so as to indicate divisions, each of which is one square inch.)

Emplastrum Cantharidis. *Cantharides Plaster.* (Cantharides in powder, twelve ounces; yellow wax, seven ounces and a half; prepared suet, seven ounces and a half; resin, three ounces; prepared lard, six ounces.) One in three.

Emplastrum Calefaciens. *Warming Plaster.*

Synonym. Warm Plaster. (Cantharides, in coarse powder, expressed oil of nutmeg, yellow wax, resin, of each four ounces; resin plaster, three pounds and a quarter; soap plaster, two pounds; boiling water, one pint.) One in twenty-four, nearly.

Liquor Epispasticus. *Blistering Liquid.*

Synonym. Linimentum Cantharidis. (Cantharides in powder, five ounces; acetic ether, a sufficiency. Mix the cantharides with three fluid ounces of acetic ether, pack in a percolator, and after twenty-four hours' maceration, percolate slowly with acetic ether till twenty fluid ounces are obtained.) Contains one ounce to four fluid ounces.

Tinctura Cantharidis. *Tincture of Cantharides.* (Cantharides, in coarse powder, a quarter of an ounce; proof spirit, twenty fluid ounces. Prepared by maceration and percolation.)

Unguentum Cantharidis. *Ointment of Cantharides.* (Cantharides, one ounce; yellow wax, one ounce; olive oil, six fluid ounces.)

Therapeutics. Cantharides, when applied externally, produces at first rubefacient and irritant effects, followed by vesication, if the preparation is strong, or the application long continued; not unfrequently the active principle becomes absorbed, and the symptoms resulting from its internal administration then ensue. When taken internally in medicinal doses, the first indication is generally some diuresis, with a slight sensation referred to the neck of the bladder; and if the urine be then examined, it usually shows a trace of albumen; sometimes also a few blood discs are discovered by the microscope: when continued beyond this, strangury and bloody urine are produced, with priapism, sometimes aphrodisiac effects, and diminution or suppression of urine, and its consequences, convulsions and death; the spinal cord is supposed to be influenced by the drug.

Externally the Spanish fly is often used as a rubefacient in the form of a liniment, made with the tincture or acetum cantharidis, in cases where rubefacients in general are indicated; it has the advantage of acting more slowly and for a longer period, and being less irritating to the patient, than strong ammoniacal or acetic acid embrocations: as a vesicant its employment is very general, more so than that of any other agent; it forms the basis of the common blister, or emplastrum cantharidis, liquor epispasticus, and of other blistering applications, as the vinegar of cantharides, &c.; the ointment and blistering paper are used to keep open blistered surfaces. These applications are useful over inflamed deep-seated parts, as in pleuritis, pericarditis, pneumonia, and other internal inflammations, after the more active febrile symptoms have been subdued; and in cases of diseased and painful joints. Vesication is also made use of on account of its revulsive action in internal congestions, as of the head, &c.; and over painful parts unattended with inflammatory action, as in various neuralgic affections; and lastly, in diseased conditions of the skin itself.

Internally the tincture of cantharides is given in chronic affections of the nervous system, especially of the spinal cord, as in chronic forms of paraplegia and in incontinence of urine from want of tone in the bladder; occasionally it has been found useful in some non-inflammatory forms of albuminuria, and in hydrocephalus; also in skin affections, especially in those of a squamous character; probably its diuretic action may be the cause of its value in the latter class of diseases. Sometimes it has been given in gleet and other mucous discharges.

Precautions to be used in the application and administration of Cantharides.

When the kidneys are acutely affected, the use of cantharides, externally or internally, should be avoided, as the cantharidin is apt to become absorbed. In young or very debilitated subjects vesication by this agent should be cautiously produced, as sloughing may ensue and prove troublesome and even dangerous: placing a piece of tissue-paper over the surface and removing the blistering application before vesication has been fully induced, and the subsequent application of a poultice, will often prevent the occurrence of strangury, and, at the same time, too great injury to the skin; vesication will generally ensue after the poultice has been applied. Even in healthy children, liniments containing cantharides should not be applied to large surfaces without much caution; the writer has known severe hæmaturia, lasting for several days, excited by the application of liquor epispasticus to the scalp for the cure of ring-worm. Many substitutes for the ordinary blistering plaster have been used, such as the tela vesicatoria, and blistering papers made by mixing an ethereal or oily solution of cantharides with wax and fatty matters, and spreading the compound thinly on cloth or tissue paper (*e.g.*, the official charta epispastica); also blistering liquids prepared by dissolving *cantharidin* in acetic acid and ether, or chloroform. The liquor epispasticus of the Pharmacopœia, which the author has extensively employed, vesicates with much certainty; it should however be used with caution. As blistering agents, these liquid applications are more efficient than the acetum cantharidis, but the latter may be used as a rubefacient.

Dose. Of tincture of cantharides, 5 min. to 20 min.

Adulteration. A beetle called the golden beetle has been found mixed with cantharides, and occasionally beads coloured to imitate the Spanish fly have been added to increase the weight. It has also been asserted that flies deprived of their virtues by ether have been sold as genuine, and that euphorbium resin has been employed to adulterate powdered cantharides.

Several other coleopterous insects, as Mylabris chicorii, &c., possess vesicating powers, and have been used in other countries as blistering agents.

CLASS, ANNELIDA.

HIRUDO. The Leech. Sanguisuga medicinalis, the Speckled Leech; and Sanguisuga officinalis, the Green Leech. Collected in Spain, France, Italy, and Hungary.

Description. Leeches have an elongated body, 2 or 3 inches long, tapering to each end, plano-convex, wrinkled transversely; of a dark olive-green colour, with six rusty-red longitudinal stripes; made up of from 90 to 100 soft rings, with a muscular disc at each extremity, the hinder one the largest; the mouth, which is in the anterior disc, is tri-radiate, and contains three jaws, each of which is furnished with two rows of teeth; the intestinal canal is straight.

The Sanguisuga medicinalis is distinguished by the greenish-yellow colour of the belly, spotted with black, and the Sanguisuga officinalis by the olive-green colour of the belly, which is not spotted.

Therapeutics. Leeches are employed for the local abstraction of blood from those parts where cupping is not deemed advisable. The quantity of blood drawn by a leech is about one fluid drachm and a half, though by fomentation of the part perhaps half a fluid ounce may be obtained. The skin should be thoroughly cleansed, and washed with a little milk, before leeches are applied. Care should be taken to prevent their entrance into the cavities of the body, such as the mouth, rectum, and uterus: in such cases they may be introduced in leech-glasses, which only allow the head to be protruded. The dangerous accidents which may result from the passage of a leech into the stomach, &c., are combated by injections of salt and water.

Bleeding from leech-bites may be stopped by pressure, by matico, by the application of collodion or of caustic; sometimes they require a suture.

CLASS, SPONGIDA.

SPONGIA USTA. Burnt Sponge. (Not official.)

Prop. & Comp. Burnt sponge contains a large amount of carbon, mixed with carbonate and sulphate of calcium, chloride of sodium and iron ; also from 1 to 2 per cent. of iodide of potassium, with some bromide. It is upon the presence of these latter constituents that its medicinal properties depend.

Therapeutics. Burnt sponge was formerly much recommended in goître and strumous glandular swellings, in which cases it is still sometimes given.

Dose. 30 gr. to 100 gr. or more, made into an electuary.

THERAPEUTICS.

The object of this portion of the Work is to present to the reader, not any further account of the mode of action of individual drugs, but some general rules as to the method of prescribing remedies, the effects of which have been already detailed ; and as to the form, manner, and times at which they should be administered, according to the effect to be produced ; also to instruct him how to avoid incompatible combinations, and lastly to give a classification of remedial agents of a practical character, which may prove valuable when treating disease.

In endeavouring to accomplish these objects, conciseness will be aimed at, in order not to enlarge the work too much, and at the same time to avoid distracting the mind by unimportant or useless discussions.

At the present day, when it is to be hoped that medicine is emerging from an empiric art to a condition which renders it worthy of a place among the Sciences, it is especially important that that department which is perhaps the most backward, namely, Therapeutics, should receive due attention from both the student and practitioner, and be investigated with every possible care, so as to ensure accuracy ; and to effect this, where the human subject has to be dealt with, and where disease is constantly changing and presenting varying aspects, is a task of great difficulty, and one requiring every possible precaution.

In the first place it is important that there should be the greatest simplicity in prescribing ; no medicine should be given unless a real reason can be ascribed, and combinations of drugs should be avoided when there are no direct indications for them ; much discredit has been thrown upon the whole subject of the medicinal treatment of disease by the practice of indiscriminate prescribing and over-drugging ; and this habit has given rise to the adoption of therapeutic systems, which have no more reality than that of being antagonistic to such practices.

Many appear to prescribe with an idea that if numerous drugs are given at the same time, one of them at least may prove effectual; but it should not be forgotten that some may do harm instead of good: such indefinite mixtures, often excused under the plea that the power of combination in altering the action of medicines is of much importance, should be carefully avoided by those who wish to gain a clear insight into the real action of medicines and to advance the knowledge of therapeutics. It must not however be supposed that all combinations of drugs are injurious; on the contrary, it is a well established fact that they are occasionally very valuable, and many illustrations can be adduced. It is found, for example, that some purgative medicines act more especially upon one part of the intestinal canal, and some on another portion; that one drug increases the vermicular or peristaltic action of the bowels, and another causes a large flow of fluid from the mucous membrane; and in practice it is readily demonstrated that not unfrequently when each of two purgatives given alone causes unpleasant effects, a combination of the same is productive of satisfactory results. Senna, for instance, generally gripes, from causing an irregularity in the contraction of the bowels; Epsom salts often cause flatulent distension; but the two combined in the common black draught, form an efficient and valuable cathartic, from which it may be inferred that when we wish for a thorough evacuation of the intestinal canal, a judicious combination of several individual purgatives, which act on different portions and in different ways, is much more efficient than any one of them given separately.

Form in which medicines should be exhibited, and time of administration.

The form in which medicines should be given, whether in a fluid or solid state, as also the time of day, and its relation to the hour of meals, are points of much importance to be attended to. If it is desirable that a medicine should be quickly absorbed into the system, it should, if possible, be given in the form of solution, and care taken that the stomach be completely empty; when the drug is in a solid form, time is necessary in order to effect its solution in the fluids of the stomach; if food be present, the current is from the blood into the cavity of the organ, and not from the stomach towards the blood. Let an equal amount of strychnine be given, first in the form of a pill, in which the alkaloid is united with some combining material, and next in the form of a solution, and the difference of time which elapses before the production of the peculiar symptoms of the drug will be well marked. Again, if the extract of nux vomica be given, at one time on an empty stomach, and at another time directly after a meal, a similar difference in the period at which the physiological effects are manifested will be observed. The same phenomena are seen when other drugs producing well defined effects are substituted for strychnine or nux vomica. If the slow action of any remedy be desirable, the reversed conditions should be ensured; namely, a full state of stomach and little solubility of the drug.

In the exhibition of remedies which influence the alimentary canal a proper selection of the time and form of administration should not be lost sight of.

1. In cases where we seek to allay irritation of the stomach, or to give tone to that organ, the medicine should be taken from half an hour to an hour, or even longer, before food.

2. Medicines which have a strong alkaline reaction should either be taken an hour before, or not until three or four hours after a meal. Under the first conditions they neutralise any acid present, and then become quickly absorbed by the veins into the blood; under the second, they neutralise acidity which is left from the digestive process, and relieve the heartburn so often produced by its presence; but if such remedies are administered at the time of the meal, as is often advised, especially with Vichy water, they are apt to cause discomfort from an arrest of the digestive process; it being necessary that the contents of the stomach should be acid, in order that digestion be quickly and perfectly performed.

3. Medicines which are taken with a view to their absorption, the improvement of the state of the blood, and general nutrition of the body, are perhaps best administered either at the time of the meal or soon afterwards. This remark applies more especially to the preparations of iron when given as hæmatinics or blood restorers, also to cod-liver oil and such-like substances. Iron taken at such periods appears to be absorbed with the chyle into the blood, and is therefore present during the production of the blood cells, the formation of which it probably aids.

4. Medicines which are apt to irritate the stomach should be taken soon after food, as their topical influence is then considerably lessened; arsenical compounds are thus conveniently taken, and they are often readily borne in such conditions, whereas upon an empty stomach they would cause great annoyance.

5. If a drug is given to promote sleep, the time of its adminis-

tration must vary according to its condition of solubility, the peculiarity of the medicine itself, or the idiosyncrasy of the patient; if in the form of pill, it should be given at a much longer period before the soporific effect is desired, than when in solution; and again, some patients are more quickly brought under the influence of narcotics than others.

6. Custom influences the time required for the action of such remedies: opium, for example, when first taken, may produce its soporific effect in half an hour or so; but after some days or weeks, the same dose may require many hours to cause a similar result. In some patients it is necessary to administer the drug twenty-four hours before the time desirable for it to take effect; that is, to ensure sleep on the night of any one day, it must be given on the evening of the day previous; hence if the dose is at any time omitted, the absence of sleep is not discovered that night, but the one following.

7. The time of administration and the form of exhibition have considerable influence upon the action of purgatives. In giving these remedies, the effect upon the stomach is not often required, but only that on the lower portions of the alimentary canal, and therefore, it is, as a rule, desirable to administer them either half an hour or so before a meal, or at least four hours afterwards. When prescribed before food, their effect is generally more marked: a dinner pill with one grain of the extract of aloes will often prove efficient if taken before a late dinner, but may produce little effect if taken at bedtime. The object, in cases where a habitual slight aperient is required, is to give it at a time when the stomach may be annoyed by it as little as possible.

8. In the case of anthelmintics, the patient should fast for many hours before they are taken, in order that by coming in close contact with the entozoa they may destroy them.

Incompatibility in Prescribing.

But few years have elapsed since the subject of incompatibility in prescribing occupied a considerable space in most works on Materia Medica, and great stress was then laid upon such knowledge; but a more enlightened investigation has clearly shown, that much of the so-called incompatibility was therapeutically ideal: it is desirable therefore, to point out the erroneous views which were then held, and at the same time to show the necessary precautions to be observed. It was formerly supposed that if two drugs were ordered in combination which were capable of forming a compound insoluble in water, such combination was incompatible. If, for example, ipecacuanha was ordered with a vegetable containing tannic acid, it was considered improper, as tannate of emetine is not soluble: but the error of this is at once obvious if it is remembered that many substances insoluble, or not apparently soluble, in water, may be readily dissolved by the secretions of the stomach and intestines, and hence easily absorbed into the blood; tannate of emetine will cause vomiting, tannate of strychnine produce all the medicinal and poisonous effects of that alkaloid, and tannate of morphine induce sleep; probably the tannates of the alkaloids are less readily absorbed than their more soluble salts, but, practically, the combinations are equally effectual as therapeutic agents. If the old view of incompatibility were correct, it would be difficult to account for the activity of calomel, reduced iron, subnitrate of bismuth, and very many other substances which are constantly administered with marked effect upon the system.

However, it must not be supposed that all combinations are admissible: there are certain limits beyond which it is unadvisable to go. If, for example, sulphuric acid, in the form of the acid infusion of roses, is prescribed for its astringent effect as a draught, and acetate of lead is at the same time given as a pill, it is almost certain that the effect will be materially diminished, and the action of the lead salt altogether neutralised, for the sulphate of lead then formed is not capable of being absorbed in appreciable quantities.

Again, other examples of incompatibility which have occurred in actual practice may be mentioned. Compound camphor liniment has been prescribed with acetic acid as a stimulating embrocation; if the amounts of these separate drugs were proportional, the acetic acid would completely neutralise the ammonia of the former preparation, and but little stimulant or counter-irritant effect would be produced by the combination. This is one of many instances of both chemical and therapeutic incompatibility.

There is another instance of incompatibility which may be noted. Creasote is often indicated as a remedy in the same cases as oxide of silver, and these two medicines have been prescribed together in the form of a pill: when however oxide of silver comes in contact with creasote, the former parts with its oxygen to the latter, much heat is evolved, and instances have been known of combustion taking place on the chemist's counter, from such a combination.

Other instances of real incompatibility are seen in the combination of caustic alkaline solutions, as the solution of potash, with preparations of henbane, stramonium, and belladonna ; after a few hours, the activity of these latter drugs is totally destroyed by the alkali : the alkaline carbonates and bicarbonates however, possess no such destructive influence.

One of the many instances of incompatibility in a physiological point of view may be adduced by way of example ; thus Calabar bean appears to be more or less antagonistic in its effects to belladonna, both when externally applied and when administered internally.

Mode in which Medicines are introduced into the System.

There are several methods by which drugs are introduced into the system, a succinct account of which we shall now give under their separate heads.

Medicines are administered by the mouth and by the rectum ; also by causing them to be absorbed by the respiratory mucous membranes in the form of vapour (inhalation) ; likewise by the skin ; by injection into the cellular tissue (hypodermic injection); and, on very rare occasions, by being injected into the veins : for more topical purposes they may also be applied to various other mucous membranes.

1. *By the Mouth and Stomach.* This is by far the most common mode of giving medicines, and one which appears most natural and convenient, and requires no instrumental aid. This method, however, has both its advantages and its disadvantages. The advantages consist in the fact that most soluble substances are readily absorbed by the stomach, and thus quickly introduced into the blood, as is shown by giving iodide of potassium, for it is not uncommon to find iodine in the urine twenty minutes after it has been ingested. Furthermore, substances which are little soluble in water, are often easily dissolved in the stomach ; the solubility of calomel in water, for example, is scarcely appreciable, and yet there is abundant evidence to show that the system is readily affected by its administration through the mouth.

The disadvantages which sometimes accrue from this mode of giving medicines arise, first from the patient tasting the drugs, which, unless in the form of pill, are often nauseous ; next, from their sometimes interfering with or disturbing the digestive function, which may prove a serious inconvenience to the patient ; and lastly, from the process of digestion affecting their absorption.

The advantages however of giving medicines by the mouth far outweigh the disadvantages

2. *By the Rectum.* Medicines can be thus administered, either in the form of enemata or suppositories.

If the amount of fluid in an enema is large, as from half a pint to a pint and a half, it usually excites the peristaltic action of the colon and rectum, and thus causes a purgative effect ; and water, or water thickened with starchy matters (as in the form of gruel, arrow-root, &c.), is frequently administered for this purpose ; purgative drugs, as castor oil, Epsom salts, &c., are often added to increase the cathartic effect.

If however, the object is to cause absorption of the medicinal agents into the system, the quantity of fluid should be small, perhaps from one to three ounces ; under such circumstances it will generally become absorbed, and produce its effects upon the system in general. Remedies thus given exert a local as well as a systemic action ; for example, in cases of irritable rectum and bladder, a small amount of opium administered by the rectum will often give greater relief than a much larger dose given by the stomach.

It should be remembered that active drugs, *e.g.*, the alkaloids, are even more readily absorbed from the mucous membrane of the rectum than from that of the stomach.

Suppositories, of which there are several in the British Pharmacopœia, are convenient forms for the application of drugs when the local effect upon the rectum or neighbouring parts is required.

3. *By inhalation.* The employment of medicines in the form of vapour has been increasing of late years, more especially in cases where it is desirable to overpower the system rapidly, as when anæsthetics are given to prevent pain in surgical operations. Inhalation may also be employed when local effects are required, as when stramonium is smoked, or conium, creasote or hydrocyanic acid is required to allay irritation of the respiratory passages. Various non-volatile drugs may be brought in contact with the bronchial mucous membrane by causing their solutions to be inhaled in the form of fine spray, generated by an instrument called an atomiser.

It can be easily proved that the desired effect upon a diseased part of the respiratory tract can be produced by a much less amount of the drug when administered in the way of inhalation, than when given by the stomach.

4. *By the skin.* Medicines may be administered by the skin, either by rubbing them, in the form of ointment or glycerine compounds, thoroughly into a part where the cuticle is thin, or by applying lotions constantly to the part, at the same time pre-

venting evaporation, or, lastly, a more ready way of causing their absorption is to denude the skin by a blister, and then sprinkle the drug over the raw surface. When the latter process is adopted, irritation is likewise produced, which is occasionally useful over painful or diseased parts. The system can readily be brought under the influence of mercury by simply rubbing in the mercurial ointment; the effects of morphine and other alkaloids are soon observed when they are applied to a denuded surface.

5. *By subcutaneous injection.* The method of introducing medicines into the system by subcutaneous injection has gained much ground of late, and has been attended with great success. When a medicine in solution is thus used, its effects are extremely rapid; if morphine, for example, is injected, contraction of the pupil may be observed within a minute, and pain or spasm if present is at once alleviated. The influence, at any rate of opium or morphine, is not simply topical, for it is found that in pain of any part, *e.g.*, of one sciatic nerve, the alleviation is equally wrought whether the injection takes place in one thigh or the other, in the arm, or in fact in any part of the body.

The dose of any drug for subcutaneous injection is much less than when it is administered by the stomach; for the effect of the whole quantity is at once produced upon the system when it is introduced into the cellular tissue, whereas some little time is required for absorption by the mucous membrane of the stomach, even when the substance is in a dissolved state.

6. *By injection into the veins.* Injection of medicines into the veins is hardly ever resorted to at the present time: the method was employed occasionally for the purpose of restoring to the blood its watery and saline parts, in cases of choleraic collapse; —there are many objections to the plan.

CLASSIFICATION OF MEDICINES.

Medicines have been very differently classified, at different times, by authors on Materia Medica and Therapeutics; some adopting a chemical and natural historical division, as is the case with the previous part of the present volume; others a physiological and therapeutic classification. For the purpose of rendering a complete account of the action and use of each medicine, the former method is doubtless the more convenient and instructive, as all the facts pertaining to the action of individual drugs are thereby brought before the mind and easily retained; but when a knowledge of the value of remedies is required for practical purposes, to effect a desired object in the treatment of disease, then a classification based upon some physiological grounds will be found to be the more useful.

In the following classification, the author has been guided by a desire to make it one of practical utility rather than of scientific interest; and he feels assured that in the present imperfect state of our knowledge concerning the action of medicines upon the animal economy, he will best effect this by referring his arrangement to the organs and structures of the body, which are influenced by the drugs, rather than to the character of the action thereby exercised.

It has been the object of the author to retain such grouping of medicines as experience has long confirmed and ratified, and to avoid such subtleties of division as serve only to perplex the mind and lead to no useful results.

DIVISION I.

Internal remedies; medicines which are administered for their effects upon the system both before and after absorption into the blood.

Class I.—Medicines which act upon the *blood*, altering its composition, and hence influencing the whole system, and the nutrition of the body.	Order 1. Blood tonics. 2. Alkaline remedies. 3. Acids and astringents. 4. Refrigerants. 5. Antipyretics. 6. Alteratives (subdivided into several groups).
Class II.—Medicines whose principal effects are seen upon the *nervous* system.	
SUBCLASS 1. Medicines acting especially on the *brain* proper, but probably also upon other portions of the *central nervous system*.	Order 1. Exhilarants. 2. Narcotics, soporifics, and anodynes. 3. Anæsthetics.
SUBCLASS 2. Medicines acting especially upon the *spinal cord*.	Order 1. Spinal stimulants. 2. Spinal sedatives.
SUBCLASS 3. Medicines acting upon some portions of the *nervous centres*, and on the *ganglionic system*.	Order 1. Antispasmodics. 2. Nervine tonics and antiperiodics.

Class III.—Medicines acting chiefly on the *heart* and *circulatory* system; probably often through the vasomotor system of nerves.	Order 1. Vascular stimulants 2. Vascular sedatives. 3. Vascular tonics.
Class IV.—Medicines acting upon *special organs*.	
SUBCLASS 1. Medicines which act especially on the different portions of the *alimentary canal*.	Order 1. Sialagogues. 2. Emetics. 3. Purgatives or cathartics. Group 1. Laxatives. 2. Simple purgatives. 3. Drastic purgatives. 4. Hydragogue purgatives. 5. Saline purgatives. 6. Cholagogue purgatives. Order 4. Anthelmintics. 5. Stomachic tonics. 6. Stomachic stimulants or carminatives. 7. Stomachic sedatives.
SUBCLASS 2. Medicines affecting the *respiratory* organs and passages.	Order 1. Errhines. 2. Expectorants (pulmonary stimulants). 3. Pulmonary sedatives.
SUBCLASS 3. Medicines acting on the function of the *skin*.	Order 1. Sudorifics, diaphoretics.
SUBCLASS 4. Medicines affecting the function of the *kidneys* and *urinary* organs.	Order 1. Diuretics. 2. Lithontriptics. 3. Medicines influencing mucous membrane of urinary tract.
SUBCLASS 5. Medicines whose action is upon the *generative* organs.	Order 1. Emmenagogues and Ecbolics. 2. Aphrodisiacs. 3. Anaphrodisiacs.
SUBCLASS 6. Medicines which act upon the *eyes*.	Order 1. Pupil dilators. 2. Pupil contractors.

DIVISION II.

External remedies; or medicines which act locally, and are not employed to affect the constitution.

Order 1. Irritants.
  Group 1. Rubefacients.
  2. Epispastics or blistering agents.
  3. Pustulants.

Order 2. External sedatives.
3. Emollients and demulcents.
4. Astringents and styptics.
5. Caustics and escharotics.

DIVISION III.

Chemical agents used for other than their medicinal properties.
Order 1. Antidotes.
Order 2. Disinfectants and Antiseptics.

DIVISION I.

Class I.—Medicines whose primary action is upon the blood, altering its character and composition and through it influencing the whole system :—

Order 1.—Blood Tonics. Analeptic Tonics. Blood Restoratives.

Medicines which possess the power of improving the quality of the blood, by the restoration of principles in which it is deficient.

Reduced iron.
Dialysed iron.
Carbonate of iron.
Hydrated peroxide of iron.
Sulphate of iron.
Phosphate of iron.
Peracetate of iron.
Perchloride of iron.
Pernitrate of iron.
Citrate of iron and ammonium.
Tartarated iron (tartrate of iron and potassium).
Citrate of iron and quinine.
Iodide of iron.
Oxide and salts of manganese (?)
Cod liver oil.
Other animal oils.
Vegetable oils.

Appropriate alteration of diet to suit individual cases.—As fresh fruit and vegetables.

Adjuvants to blood tonics.—Fresh air, light, exercise, &c.

Effects of Blood Tonics. The effects produced by the different blood tonics are necessarily of a very diverse nature. If the blood is deficient in any element or proximate constituent, the exhibition of medicine, or food containing such deficient substance, has the effect of restoring the fluid to a healthy condition.

In the lower animals, when living in a state of nature, it is probable that, so long as they are able to procure food, such a state of blood rarely occurs ; for their diet contains all that is essential. If the animal be carnivorous, then he eats all the parts of his prey, including the blood ; if herbivorous, the vegetable substances contain all that is necessary in his food.

Man, however, by cooking his food, sometimes deprives it of some of the essential elements, and hence disease may from this cause be engendered. The most frequent morbid conditions which ensue from deficiency in diet, and other causes, are :—

Anæmia, or bloodlessness, caused by a deficiency of red corpuscles in the blood; wasting or imperfect flesh-making, and true scorbutus or scurvy.

Therapeutic applications. The use of blood tonics is indicated in the above-named conditions. If anæmia is present, then the salts of iron, the peculiar properties and value of which will be found under the respective heads, should be given. The value of the manganese salts in such cases is questionable. If there is wasting of the body from different causes, then cod-liver oil is valuable, or some fatty or oily matter should be added to the food; and lastly, if there is a scorbutic condition, then fresh vegetables and fruits, and certain salines contained in them, prove almost invariably curative.

Order 2.—ALKALINE OR ANTACID MEDICINES.

Agents which increase the normal alkalinity of the blood, and through it, either reduce the acidity, or render alkaline the secretions which are acid in health, or increase the alkalinity of such as are normally alkaline.

1. *Direct Alkaline Remedies.*

Solution of caustic potash.
Carbonate of potassium.
Bicarbonate of potassium.
Solution of caustic soda.
Carbonate of sodium.
Bicarbonate of sodium.
Solution of caustic lithia.
Carbonate of lithium.
Bicarbonate of lithium in solution (lithia water).
Magnesia.
Carbonate of magnesium.
Bicarbonate of magnesium in solution (fluid magnesia).
Lime water, and strong saccharine solution of lime.
Carbonate of calcium (chalk).

2. *Direct but not remote Antacids, at least on the Urine.*

Solution of ammonia.
Carbonate of ammonium.
Aromatic spirit of ammonia.
Wood charcoal.
Animal charcoal.

3. *Remote Alkaline Remedies.*

Salts of potassium with a vegetable acid, as acetate, citrate, and neutral tartrate of potassium.
Acid tartrate of potassium (in small doses).
Salts of sodium with a vegetable acid.
Citrate of lithium.

Effects of Alkaline or Antacid Remedies.—It will be seen that a subdivision of these medicines is made into *direct* and *remote* antacids. The direct antacids are alkaline in their reaction, will turn reddened litmus paper blue, and hence when they come in contact with acid in the alimentary canal they neutralise it at once; after absorption into the blood they probably increase the alkalinity of this fluid, and certainly, with the exception of the salts of ammonium, cause alkalinity of the secretions, especially of the urine. The remote antacids differ from the first subdivision in possessing no alkaline reaction; in fact, one, the cream of tartar, or acid tartrate of potassium, has a strong acid reaction; hence they cannot be used if the neutralisation of the acid in the stomach or intestines is desired. Free ammonia and carbonate of ammonium have the power of neutralising acid in the alimentary canal, but do not affect the urine; their effect on the blood has not been determined. Independently of their alkaline or antacid powers, each group of these remedies has some special effect on different organs; thus, salts of potassium act more especially on the kidneys, salts of sodium upon the liver, salts of calcium tend to cause constipation, and salts of magnesium have a purgative effect. Salts of ammonium appear to influence the skin and pulmonary mucous membranes; whether they diminish the acidity of the cutaneous secretion has not been clinically demonstrated. Lastly, salts of lithium act very powerfully as diuretics, and the urate of lithium is the most soluble salt of uric acid.

The vegetable acids of the salts of the fixed alkalies and alkaline earths are decomposed in the system, and the bases appear in the urine in the form of carbonates.

Therapeutic applications. 1. To neutralise acidity in the stomach and intestines, and hence relieve heartburn and other symptoms induced by an over-acid state of the alimentary canal.

2. To augment the alkalinity of the blood, which is altered in many diseases—as in febrile states, rheumatism, gout, albuminuria, &c.

3. To alter the secretions from the blood, more especially the urine (see Lithontriptics), and to influence the secreting organs, and the mucous membranes of many parts.

From what has been stated under the head of the Effects of Alkaline Medicines, a proper selection of them can readily be made in different diseases.

Order 3.—Acids and Astringents.

Acid and astringent medicines have been grouped together, because it is probable that all the acids, vegetable and mineral, are more or less astringent in their action, although there are other drugs not acid in reaction, which are also powerfully astringent; hence the acids form only one group of these latter remedies. Astringents are substances which produce some alteration in the composition and character of the blood, increasing its disposition to coagulate, and probably causing at the same time contraction of the blood-vessels and a diminution of the secretions from the different organs and secreting surfaces throughout the body.

Vegetable Acids, and substances containing them.

- Acetic acid.
- Vinegar.
- Tartaric acid.
- Citric acid.
- Tannic acid.
- Gallic acid.
- Benzoic acid.

Substances containing Tannic, Gallic, Catechuic, or other allied acids—as

- Nut galls.
- Oak bark.
- Catechu.
- Kino.
- Eucalyptol.
- Logwood.
- Rhatany root.
- Rose leaves.
- Guarana.
- Tea.

Mineral Acids.

- Dilute sulphuric acid.
- Dilute hydrochloric acid.
- Dilute nitric acid.
- Dilute nitro-hydrochloric acid.
- Dilute phosphoric acid.

- Alum.
- Sulphate of iron.
- Perchloride of iron.
- Pernitrate of iron.
- Oxide of zinc.
- Carbonate of zinc.
- Acetate of zinc.
- Sulphate of zinc.
- Oxide of lead.
- Carbonate of lead.
- Acetate of lead.

- Oil of turpentine.
- Carbolic acid.
- Creasote.
- Matico.
- Ergot.

Effects of Astringent Medicines. The blood is always alkaline in reaction, from the presence of the alkaline phosphate of sodium and some alkaline carbonates. An excess of alkalinity appears to give it greater fluidity or less coagulating power, and on the contrary, a diminished alkalinity increases its adhesive quality, and its property of forming firm clots: it seems probable that the mineral acids, when absorbed into the blood, effect this object and hence are astringents; most of them possess the property of forming insoluble compounds with albumen. The vegetable acids possess similar properties, but in very different degree; the most powerful are the tannic, gallic, and catechuic acids, and many vegetable substances containing these, as catechu, kino, &c.

Turpentine, creasote and carbolic acid exert much of their influence by causing contraction of the blood-vessels. Some astringents appear to act through the central nervous system, as opium, ergot, and probably the salts of lead.

Therapeutic applications. 1. To arrest hæmorrhage from any organ or surface. This is effected by altering the character of the blood, and causing contraction of the blood-vessels supplying the bleeding part.

2. To restrain excessive discharges from mucous membranes, an effect also produced by the changes in the blood itself and the blood-vessels.

3. To diminish an abnormal amount of the secretion from any organ, as of the skin in cases of excessive sweating; of the urine in excessive diuresis, &c.

Order 4.—Refrigerants.

The name refrigerant is given to medicines which allay febrile disturbance by relieving thirst.

Water.
Acetic acid.
Citric acid.
Tartaric acid.
Cream of tartar in solution.
Phosphoric acid.
Nitrate of potassium.
Chlorate of potassium.
Grape juice.
Orange juice.
Lemon juice.
Tamarinds.

Effects of Refrigerants. It will be observed that these medicines differ very much, although most of them belong to the group of acid and astringent remedies; their action in lowering the temperature of the body has never been clinically established, and is doubtful: still it is a fact that, when a patient is feverish, the acids and the juices of acidulous fruits are very grateful in relieving thirst.

Therapeutic applications. To allay thirst in febrile disturbance.

Order 5.—Antipyretics

This term is applied to certain agents which have the power of lowering febrile heat, independently of any specific action on particular organs or morbid products.

Salicylic acid and salicylate of sodium.
Quinine salts.
Cinchonine salts.
Cinchonidine salts.
Alcohol.
Chloral hydrate.
Trimethylamin.
Eucalyptol.
Camphor and essential oils (?).
Aconite.
Veratrine.
Digitalis.
Cold baths.
Venesection.
Purgatives.
Blisters.

Effects of Antipyretics. The precise nature of the action exerted by these agents is still somewhat obscure; it is probable that they do not all act alike. For instance, salicylic acid and its salts probably lessen the production of heat within the body by their action upon tissue changes; chloral may lower temperature by dilating the cutaneous vessels, thus increasing the amount of heat given off; quinine by checking the processes of oxidation in the blood and tissues; cold baths, by simply removing heat from the body more rapidly than it can be replaced. The influence of antipyretic drugs on the temperature of the body in health is very limited; they produce their maximum effect in cases of pyrexia, especially when due to the presence of septic matters in the system.

Cold baths have been largely employed in the treatment of enteric fever, especially in Germany. Their value is most marked in those cases where life is primarily endangered by the exaggerated degree of heat to which the organs and tissues are exposed. There can be no question that in rheumatism with hyperpyrexia—a rare and till of late always fatal form of the disease—life has been saved by the judicious use of ice baths.

Order 6.—ALTERATIVES.

The blood tonics and alkaline remedies, as likewise those which are acid and astringent, may all be said to be alterative in character, and their action is more or less understood; there are however remedies constantly employed in the treatment of disease which are termed alteratives; medicines which produce certain, at present, ill-understood changes throughout the system, but whose influence is frequently valuable. Such alteratives may be conveniently subdivided into groups.

Group 1.—*Mercurial Alteratives.*

Mercury in a highly divided state, as in blue pill and grey powder.
Subchloride of mercury (calomel).
Perchloride of mercury (corrosive sublimate).
Red iodide of mercury.

Group 2.—*Iodine Alteratives.*

Iodine.
Iodide of potassium.
Iodide of iron.
Iodide of sulphur.
Iodide of lead.
Iodide of sodium.
Iodide of arsenium.
Iodide of arsenium and mercury.

Group 3.—*Chlorine Alteratives.*

Chlorine water.
Chlorinated soda.
Chlorinated lime.
Chlorate of potassium.
Chloride of sodium.
Chloride of ammonium.
Nitro-hydrochloric acid.

Group 4.—*Arsenical Alteratives.*

Arsenious acid.
Arsenite of potassium (in liquor arsenicalis).
Hydrochloric solution of arsenic.
Arseniate of sodium.

Group 5.—*Antimonial Alteratives.*

Oxide of antimony.
Sulphurated antimony.
Tartarated antimony.

Group 6.—*Sulphur Alteratives.*

Sulphur (sublimed or precipitated).

Sulphydrate of ammonium.

Group 7.—*Phosphorus Alteratives.*

Phosphorus (in pill or oil).
Hypophosphite of sodium.
Hypophosphite of calcium.

Group 8.—*Alteratives of undetermined action.*

Sarsaparilla.
Indian sarsaparilla (hemidesmus).
Taraxacum.

Effects of Alteratives. The effects of the alteratives in the above groups are of so varying a character, that it is almost impossible to define them, unless the detailed operation of all the medicines be given; such effects will be found severally described under each separate substance. They all produce some alteration in the state of the blood, and hence upon the system at large. In some, however, the influence is most marked upon the glandular system, in others upon the serous membranes, in others upon the mucous membranes, and again, in a fourth class, upon the cutaneous tissue.

Under the influence of these alteratives peculiar morbid systemic affections become alleviated or removed, as is observed in the exhibition of mercurials and iodides in constitutional syphilis and scrofula; also in conditions of the body giving rise to cutaneous eruptions. Many of the so-called alteratives appear to exert an influence in chronic inflammatory states of the system, and to have the power of removing the morbid products which have accumulated during such action.

Therapeutic applications. From what has been stated in former parts of this work, the indications for the administration of these remedies will be readily arrived at, and need not be further alluded to in this place.

Class II.—Medicines whose principal effects are upon the nervous system.

SUBCLASS I.—Medicines acting especially upon the brain proper; but probably also upon other portions of the central nervous system.

Order I.—EXHILARANTS.

Exhilarants are medicines whose primary effect is to cause an exaltation of the spirits, and, through this influence on the brain, a general excitement or augmentation of the functions of the whole body: if taken in large quantities, many of them produce intoxication, and are therefore called *inebriants.*

Alcohol in the form of
  Distilled spirit, as brandy and whisky.
  Wine.
  Malt liquors.
Ether.
Acetic ether.
Chloroform.
Indian hemp.
Opium (in small doses).

Effects of Exhilarants. These are sufficiently indicated in the definition; they stimulate the vascular system through the influence of the nervous. Their effects are transient.

Therapeutic applications. These remedies are given in low conditions of the nervous system, and in cases in which there it is necessary to stimulate the heart and circulatory system for a time.

Order 2.—NARCOTICS, ANODYNES, AND SOPORIFICS.

Medicines which act upon the nervous system, alleviating pain (anodynes), and some causing direct sleep (soporifics).

Opium. Salts of morphine. Chloral hydrate. Butyl-chloral hydrate. Indian hemp. Hops. Lettuce ? Bromide of potassium. Bromide of ammonium. Bromide of sodium.	Soporifics and anodynes.
Belladonna. Atropine. Stramonium. Hyoscyamus.	Anodyne and antispasmodic.

Aconite.
Aconitine.
Gelsemium.
Conium ?
Digitalis.

Effects of Narcotics. All the remedies in the above list, except those to which queries are attached, and probably the bromides, produce stupor if the dose is increased beyond a certain point, and are hence called narcotics; still the different members differ essentially from one another in their action. Certain of them, soporifics, produce direct sleep; this is the case with opium and morphine salts, and chloral hydrate; bromide of potassium and Indian hemp will also cause drowsiness.

Others, which may be termed anodynes, allay pain; but in large doses delirium is induced rather than sleep. The action of opium differs considerably from that of belladonna: opium causes contraction of the pupil; belladonna dilates it. Indian hemp neither contracts nor dilates the pupil. Under the influence of opium the brain probably becomes congested; whereas under belladonna it becomes deficient in blood from contraction of the arteries of the organ.

Sleeplessness may arise from different states of the brain, and therefore some of these remedies may prove useful at one time, others at another.

Aconite produces a numbness and loss of sensation in the extremities, and when topically applied it causes local anæsthesia. Digitalis sometimes induces sleep from its influence on the circulation.

Therapeutic applications. Narcotics are used in medicine for two different purposes:—

1. To procure sleep (soporifics).
2. To allay pain and diminish spasm (anodynes).

Order 3.—ANÆSTHETICS.

Substances which when inhaled in the form of vapour possess the property of destroying consciousness, and at the same time causing insensibility to pain: they are therefore soporifics and anodynes, but their effect is more immediate and much less persistent than that of ordinary narcotics.

Chloroform.
Ether.
Tetrachloride of carbon.
Bichloride of methylene.
Protoxide of nitrogen (nitrous oxide).

Effects of Anæsthetics. These have been sufficiently detailed under the respective heads of the above anæsthetic agents.

Therapeutic applications.

1. To alleviate pain and spasm.
2. To procure unconsciousness and insensibility to pain during surgical operations and parturition.
3. To procure sleep and diminish violence in delirium tremens and some other forms of cerebral disturbance.
4. To cause relaxation of the muscular system, in order to facilitate the reduction of dislocations and of hernia.

SUBCLASS 2.—Medicines acting especially upon the spinal cord.

Order 1.—SPINAL STIMULANTS.

Medicines which increase the function of the spinal cord.

Nux vomica.
Strychnine.
Brucine (?)
Thebaïne.
Cantharides.
Phosphorus.

Arnica.
Ergot.
Opium.
Morphine.
Belladonna.
Indian hemp.

Effects of Spinal Stimulants. The action of strychnine, detailed under the therapeutics of that remedy, affords a typical illustration of the physiological effects produced by these bodies. The specific action upon the spinal cord of many of the substances in the list is somewhat doubtful; their other influences are often more apparent. The spinal action of opium is best seen in the lower animals, where the cerebral hemispheres are less developed.

Therapeutic applications. The use of these remedies is indicated—

1. In cases of paraplegia, when there no evidence of inflammatory action.

2. In cases of local paralysis.

3. In some forms of hemiplegia.

4. In cases of functional debility of the cord.

Order 2.—Spinal Sedatives.

Medicines which diminish the function of the spinal cord.

Conium (hemlock).
Gelsemium.
Bromide of potassium.
Bromide of ammonium.
Bromide of sodium.
Calabar bean.
Hydrocyanic acid ?

Effects of Spinal Sedatives. The action of conium and its alkaloid is the reverse of that of strychnine; it causes paralysis of the extremities, the function of the brain remaining intact. The bromides also appear to influence the function of the spinal cord. Hydrocyanic acid acts on the whole nervous system, so that its special influence on the spinal cord cannot be readily shown.

Therapeutic applications. Spinal sedatives are used in the following cases:—

1. In irritated conditions of the spinal cord; as in cases of paraplegia accompanied with inflammatory action.

2. In spasmodic affections, as nervous forms of cough and pertussis. Also in muscular spasm and tremor.

3. In affections in which there is over-excitement of the generative organs.

SUBCLASS 3.—Medicines acting upon some portions of the nervous centres, and on the ganglionic system.

Order 1.—Antispasmodics.

Antispasmodics are medicines which possess the property of allaying spasm, probably by giving tone to the spinal cord.

Direct Antispasmodics (spinal tonics).

Asafœtida.
Galbanum ?
Ammoniacum ?
Valerian.
Sumbul.
Musk.
Oil of rue.
Oil of turpentine.
Oil of cajuput.
Camphor.
Ammonia (free).
Carbonate of ammonium.

Indirect Antispasmodics.

1. Spinal sedatives, as conium, &c.
   Bromide of potassium.
   Bromide of ammonium.
   Bromide of sodium.
2. Nervine tonics, as salts of zinc.
   Salts of silver.
3. Hydrocyanic acid.
   Belladonna.
   Stramonium.
   Henbane.
   Indian hemp.
   Opium.
   Chloroform.
   Ether.
   Acetic ether.

Effects of Antispasmodics. The direct antispasmodics appear to give tone to the spinal cord and other parts of the nervous system, and through these to the muscular system, hence they diminish susceptibility to spasm; their typical action is seen in that of asafœtida.

The indirect antispasmodics in the table act in very different ways; some by their direct sedative influence upon the spinal cord, as conium; some by bracing up the whole nervous system, as the zinc salts and other nervine tonics; and some by their influence upon the brain, as the various narcotic remedies.

Therapeutic applications. The use of the direct antispasmodics is indicated—

1. In spasm depending on hysteria, and other weakened conditions of the nervous system.

2. In other forms of spasm; in which they should be combined with remedies which remove the cause of spasm.

Order 2.—Nervine Tonics and Antiperiodics.

Nervine tonics are remedies which give tone to the nervous system in general, and some (antiperiodics) possess the power of arresting intermittent forms of disease.

All cinchona barks.
Salts of quinine.
Salts of quinidine.
Salts of cinchonine.
Salts of cinchonidine.
Arsenical salts.
Sulphate of beberine ?
Eucalyptus globulus ?
} Antiperiodics.

Chamomile ?
Calumba ?
Quassia ?
Salicin ?

Nitrate of silver.
Oxide of silver.
Sulphate of zinc.
Oxide of zinc.
Sulphate of copper.
Salts of iron.
Nux vomica.
Strychnine.
Brucine.
Cusparia.
} Nervine tonics.

Effects of Tonics and Antiperiodics. Although all the antiperiodics in the above list are tonics to the nervous system, yet there are many substances placed therein which do not possess antiperiodic powers, and hence they must be subdivided into groups for practical purposes.

The way in which these different tonics act, and the parts upon which their action is exerted, are at present not understood.

It will be seen that queries have been placed to several of the medicines in the list, many substances having been proposed as antiperiodics of which experience has not confirmed the value.

Therapeutic applications. The *antiperiodic tonics* are administered in the following cases :

In all forms of intermittent fevers.

In intermittent forms of neuralgia.

The *nervine tonics* in spasmodic affections of the nervous system, as chorea, epilepsy, hysteria, and other forms of nervous disease, also in cases of nervous debility.

Class III.—Medicines acting chiefly on the heart and circulatory system ; probably often through the vasomotor system of nerves.

Order 1.—Vascular Stimulants.

1. *Acting more on the Heart and Larger Vessels.*

Free ammonia as in the solution of ammonia.
Carbonate of ammonium.
Aromatic spirit of ammonia.
Alcohol in the form of
  Brandy.
  Wine.
Ether.
Spirit of ether.
Oil of turpentine.
Aromatic volatile oils.
Camphor.
Asafœtida.
Valerian.
Sumbul.
Chloroform.
Aromatics.

2. *Acting more on the Smaller Vessels.*

Acetate of ammonium.
Citrate of ammonium.
Guaiacum.
Serpentary.
Sassafras.
Mezereon.
Resin.
Galbanum.
Ammoniacum.

Effects of Vascular Stimulants. There are certain drugs which act more especially as stimulants to the heart and larger vessels, others on the minute arteries and capillary system; in practice it is important to separate them; thus, if it is desired to rouse the heart quickly to more powerful action, ammonia and the carbonate of ammonium will often effect the object, whereas the salts of ammonium, in which the alkali is combined with a vegetable acid, as the acetic or citric, will be powerless, although the action of these salts may prove of much value in increasing the capillary circulation; the vascular stimulants which act in these different ways are indicated in the list.

Therapeutic applications. The use of the above remedies which act especially on the heart is indicated in cases in which the function of this organ is very languid; this condition may occur from many causes, either temporarily from a lowering of the nervous supply of the heart, or more permanently in cases where the walls of the organ have become weakened; in the latter case the stimulants should either be combined with vascular tonics, or the use of the latter should be soon substituted for the former.

Those vascular stimulants, which act on the small vessels and capillary circulation, are indicated in chronic inflammatory affections in which the circulation of the diseased parts is sluggish; and also to aid the absorption of matters deposited during the more acute inflammatory stages. Many of these remedies augment the function of various special organs.

Order 2.—Vascular Sedatives.

Vascular sedatives are medicines which possess the power of depressing the action of the heart or other portions of the circulatory system.

Effects of Vascular Sedatives. As in the case of vascular stimulants, so with vascular sedatives; some act more especially on the heart itself, others on the smaller vessels; and the division into the two groups is of real therapeutic importance. Those acting principally on the heart often cause intermission of the pulse, as digitalis, colchicum and aconite.

1. *Acting especially on the heart.*

Digitalis.
Green hellebore.
Tobacco.
Aconite.
Colchicum.
Hydrocyanic acid.
Calabar bean.
Veratrine.

2. *Acting on the smaller vessels and capillary system.*

Tartarated antimony.
Oxide of antimony.
Nitrate of potassium.
Acetate of lead.
Ipecacuanha.
Ergot.
Amyl nitrite.
Nitroglycerine.

Therapeutic applications. When the heart is turbulent in its action, then the sedative remedies which act upon this organ are indicated; the medicine most frequently resorted to is digitalis: it seems probable that this drug in reality stimulates the heart through its nerves, but nevertheless the effect is sedative, the organ becomes quieter, and the circulation more perfect; it must be remembered that a turbulent cardiac condition is often combined with a very imperfect flow of blood through the cavities of the heart. The other remedies, as green hellebore, aconite, and colchicum, are sometimes used as direct cardiac sedatives.

The preparations of antimony appear only to depress the heart's action together with that of the general circulatory system; they are employed, as are also green hellebore and other sedatives, to subdue vascular action in inflammations of various organs. It is questionable whether hydrocyanic acid acts on the vascular system, except in an indirect manner; it is most useful as a cardiac sedative when the over-action is dependent on dyspepsia. Colchicum has certainly a very notable, almost specific power, over gouty inflammation. Ipecacuanha, in large doses, has considerable power in lowering the circulation, and both it and acetate of lead may be used with much advantage in many forms of hæmorrhage. Ergot may also be employed, especially in menorrhagia.

Order 3.—Vascular Tonics.

Vascular tonics are medicines which give tone or strength to the heart and other parts of the circulatory system when weakened by disease.

Iron preparations.
Digitalis.
Acid and astringent remedies.
Nervine tonics.
Stomachic tonics.
Blood tonics.

Effects of Vascular Tonics. It will be seen by the above list, that the tonics of the heart and vascular system differ much in their nature, a fact easily explained when it is considered that whatever improves the general nutrition of the system, fortifies the heart and blood-vessels ; iron preparations, however, and the mineral acids are often of great utility in cases of cardiac weakness. It will be observed that digitalis is placed among the vascular tonics, and it is probable that although sedative in its effects when the heart is turbulent, its action in small doses is that of a tonic to its walls.

Therapeutic applications. From the above it will be at once apparent when these remedies are required ; it may, however, be remarked that in certain cases of cardiac weakness, accompanied with dilated ventricles, digitalis is useful, especially when combined with ferruginous preparations.

Class IV.—Medicines acting upon special organs.

SUBCLASS 1.—Medicines which act especially on the different portions of the alimentary canal.

Order 1.—SIALAGOGUES.

Sialagogues are medicines which have the property of exciting the flow of saliva and buccal mucus.

Topical or Direct Sialagogues.

Pellitory root.
Horseradish.
Mustard.
Tobacco (when masticated).

Remote Sialagogues.

Mercurial salts (given to a certain extent).
Iodide of potassium.
Other medicinal iodides.
Jaborandi.

Effects of Sialagogues. Some sialagogues produce their effects by their topical action ; some by their influence after absorption into the system, and some possess both these properties, more especially tobacco.

When iodide of potassium is administered, a peculiar taste is frequently detected in the mouth, and sometimes a marked increase of mucus is observed ; but many of the recorded cases of salivation and ptyalism are instances of the power of iodine in bringing back into the blood, mercury, which had been previously taken by the patient, and causing it to reproduce the ordinary symptoms of this metal.

Therapeutic applications. The object to be gained by the use of sialagogues is the relief of dryness of the mouth, which is sometimes present in disease, and occasionally the production of a derivative effect, and the alleviation of some neighbouring morbid action. Sialagogues are seldom used medicinally for this special action.

Order 2.—Emetics.

Emetics are medicines which cause vomiting, by producing relaxation of the cardiac orifice of the stomach, and simultaneous contraction of the diaphragm and abdominal walls, thus effecting the emptying of the stomach.

Direct Emetics.

Sulphate of zinc.
Sulphate of copper.
Carbonate of ammonium.
Mustard flour.
Chamomile.
Common salt.

Indirect Emetics.

Ipecacuanha.
Tartarated antimony.
Apomorphine.

Emetic Agents.

Titillation of the fauces.

Effects of Emetics. The removal of the contents of the stomach by the act of vomiting is usually the principal effect sought for in the administration of emetics, but there are others which attend this act, sometimes preceding and following it, and the division of the remedies in this group depends upon the amount of the accompanying phenomena. The most constant of these are nausea, an increased secretion of mucus from the stomach and gullet, frequently a flow of bile from the gall-bladder into the duodenum, and its partial regurgitation into the stomach; also an increased flow of mucus from the bronchial tubes: emetics are therefore to some extent *cholagogues* and *expectorants.* The act of vomiting is also attended with more or less depression of the nervous system, diminution of nervous energy and of muscular contractility; there is usually increased action of the skin, sweating or diaphoresis. Direct emetics produce very little of the above phenomena.

Therapeutic applications. The more direct emetics are especially indicated when the emptying of the stomach or the mere act of vomiting is alone desired; as in cases of poisoning to remove the peccant matters: in such cases mustard, from the rapidity of its action, and the facility with which it can be procured, is peculiarly adapted. These emetics are also useful in certain cases in which very indigestible food has been taken, and discomfort thereby produced. Sometimes in disease the act of vomiting is useful for its mechanical effects, as in some cases of phthisis, bronchitis, and croup. Sulphate of copper is said to be more powerful than sulphate of zinc, but its administration has disadvantages, for if absorbed, the copper may cause unpleasant symptoms; it is therefore seldom used. Carbonate of ammonium in large doses is indicated when a stimulant effect upon the heart is required as well as the mechanical effect, as in cases of asthenic bronchitis.

The indirect emetics are used in inflammatory diseases, especially of the chest.

Order 3.—PURGATIVES OR CATHARTICS.

Purgatives are medicines which cause increased action of the bowels—that is, an unloading of the large and small intestines, with more or less alteration in the character of the evacuations.

1. *Laxative Purgatives.*

Figs.
Prunes.
Honey.
Treacle.
Manna.
Tamarinds.
Cassia pulp.
Sulphur.
Olive oil.
Castor oil.
Magnesia.
Carbonate of magnesium.

2. *Simple Purgatives.*

Rhubarb.
Senna.
Buckthorn juice.
Aloes.
Jalap.
Cascara Sagrada.
Rhamnus Frangula.

3. *Drastic Purgatives.*

Jalap.
Scammony.
Colocynth.
Croton oil.
Podophyllum resin.
Gamboge.

4. *Hydragogue Purgatives.*

Gamboge.
Elaterium.
Elaterin.
Cream of tartar (in large doses).

5. *Saline Purgatives.*

Phosphate of sodium.
Tartrate of potassium.
Tartarated soda (tartrate of sodium and potassium).
Sulphate of sodium.
Sulphate of magnesium.
Citrate of magnesium.
Sulphate of potassium.
Cream of tartar (in moderate doses).

6. *Cholagogue Purgatives.*

Grey powder.
Blue pill.
Calomel.
Aloes.
Aloin.
Podophyllum resin or podophylline.
Taraxacum (in large doses) ?
Colchicum ?
Sulphur (in small doses).

Adjuvants to Purgatives.

a. By giving tone or contractile power to the intestines :—Nux vomica and strychnine, sulphate of iron.
b. By causing more equal contraction and diminishing spasm :—Aromatic and other volatile oils ; henbane, stramonium, and belladonna.
c. By increasing the mucous secretion from the canal and by diminishing spasm :—Ipecacuanha and antimonials, in small doses.
d. Enemata, cold, and friction to abdomen.

Effects of Purgatives or Cathartics. As above stated in the definition, all purgatives cause an increase in the peristaltic action, or of the normal vermicular movement of the intestinal tube ; but the various medicines in this class act so differently in other respects, that they are capable of being subdivided with advantage into groups for practical purposes : all purgatives have a tendency to diminish the consistency of the fæcal evacuations, for mere increase of the rapidity of transit through the canal effects this, by preventing the complete absorption of liquid in the large intestines.

1. The term *laxatives* is given to purgatives which appear to effect little more than an increased peristaltic movement and a slight softening of the fæces ; some act more powerfully than others, and in the above table they are arranged in order, the mildest being placed at the top of the list.

2. *Simple Purgatives* are medicines the peristaltic action of which is greater than that of laxatives, but the other effects of the drugs in the subsequent groups are produced in a slight degree ; that is, there is no great increase in the secretion of the mucous membrane and its various small glands, nor in the exhalation of fluid from the membrane.

If a more complete knowledge could be obtained of the minute action of different purgative remedies, they would in all probability be capable of subdivision into still smaller groups, for each has doubtless some peculiarity in its action separating it from the rest, although such peculiarity may not be capable of being clearly defined at the present time ; some, for example, act more on the upper part of the small intestines, some on the lower portion, others again on the large bowel. Some purgatives augment the flow of fluid from the general surface of the intestinal canal, some increase in a great degree the peristaltic movement, and lastly, some influence the large secreting organs in connection with the intestinal canal, as the liver and pancreas. Among the simple purgatives these differences are well seen ;—

aloes, for example, acts notably upon the large bowel, and scarcely increases the fluid secretion from it, whereas jalap causes a greater flow : senna produces much contraction of the gut and griping.

In the exhibition of simple purgatives, little more than the emptying of the canal is looked for by the therapeutist.

3. *Drastic Purgatives.* There is no well marked line to be drawn between simple and drastic purgatives ; they appear only to differ in the degree of their action. In the administration of drastic purgatives, the unloading of the bowels is but one object ; a greater one is looked for in the derivative effect produced by the irritation of a large mucous surface, and also from a rather free elimination of fluid and of glandular secretions.

4. *Hydragogue Purgatives.* These medicines possess the peculiarity of causing a very large secretion of fluid from the mucous membrane of the bowels. All drastic purgatives are hydragogue to some extent, but in the case of elaterium and cream of tartar, the amount of fluid is in excess of the violence of the operation in other respects. Cream of tartar will sometimes, if given alone, fail to produce a purgative effect, and yet its hydragogue action is fully produced ; that is, it causes a copious flow into the intestinal tube, which may be again absorbed if the medicine is not combined with some other drug to cause its elimination. Many authors place gamboge in this group. The effect produced by hydragogues, beyond the ordinary purgative action, is the relief or partial emptying of the veins of the portal system, and hence of the whole circulation, together with the derivative action as in the case of ordinary drastic purgatives.

5. *Saline Purgatives.* The drugs in this group differ from those in the last in the degree of watery discharge which they produce, and in their action not being drastic in character : cream of tartar might fairly be included amongst them, and regarded as a link between the saline and hydragogue purgatives. Saline purgatives produce a similar, but much slighter, effect to the hydragogue purgatives, together with the ordinary action of other purgatives ; unless taken in a very diluted state and in large quantities, as in the form of Püllna and Friedrichshall bitter water, they are best given in combination with other aperients.

6. *Cholagogue Purgatives.* Certain purgatives appear to act upon the large secreting glands connected with the alimentary canal, especially the liver, possibly the pancreas also, and cause a

flow of bile into the intestines ; to these the name cholagogue is given.

It is questionable if these drugs have any specific effect upon the bile-secreting functions of the liver ; it is probable that many of them act simply by causing an emptying of the gall-bladder, for it is a fact that retention of bile within the hepatic ducts and gall-bladder is a very common occurrence in civilised life. It must be remembered that almost all purgatives produce more or less cholagogue effect, the saline less than the rest. It will be observed that some medicines are placed in this group with reservation, as taraxacum and colchicum ; those regarded as most efficient are the preparations of mercury, and lately, the resin of podophyllum.

Adjuncts to Purgatives. The purgative action of many drugs may be much aided by combination with others which do not of themselves possess any marked power of acting upon the alimentary canal ; illustrations of such combinations have been already given ; the medicines most frequently combined with purgatives are seen in the above table, and the peculiarities of their action sufficiently indicated.

Purgative Agents. The use of enemata of any kind.

The application of cold to the abdomen, as cold affusion, compresses of wet cloths, &c.

Faradisation and mechanical kneading of the abdomen.

Therapeutic applications. The different kinds of purgatives are employed for various purposes :

1. To unload the bowels, if not acting sufficiently.
2. To remove any irritating matters.
3. To cause an increased elimination of the secretions from the liver and pancreas, as also from the numerous glands of the mucous membrane of the alimentary canal.
4. To unload the veins of the canal, if full, by causing an increased watery secretion from the membrane ; by this means often removing congestion of internal organs, as the kidneys, and increasing their function.
5. To produce a derivative effect or counter-irritation ; that is, by causing irritation and increased secretion from a large mucous surface, to relieve distant parts, as the head, &c.

Order 4.—ANTHELMINTICS.

Substances which have the power of destroying the life of entozoa in the alimentary canal.

Direct Anthelmintics or Vermicides.

Oil of male fern (ethereal extract).
Oil of turpentine.
Kousso.
Kamala.
Worm seed and santonin.
Pomegranate (bark of root).
Tin in fine powder.
Cowhage (mucuna).

Indirect Anthelmintics, or Vermifuges.

Calomel.
Scammony.
Jalap.
Gamboge.
Castor oil.

Worm Preventives.

Sulphate of iron.
Perchloride of iron.
Other ferruginous salts.
Quassia.
Nux vomica.

Effects of Anthelmintics. The three entozoa commonly found in the alimentary canal of the human subject are, the tape worm (tænia solium and mediocanellata), the round worm (ascaris lumbricoides), and the thread worm (oxyuris vermicularis); the first occupying the small intestines and extending upwards and downwards; the second, chiefly the cæcum and ascending colon; the third, the rectum and descending colon. The true vermicides or direct anthelmintics, when they come into contact with the entozoa, either kill them or produce such an effect upon them that they are easily dislodged. Some of them, as male fern, kousso, and kamala, appear to act more effectually upon the tape worm; worm seed, and its active principle, santoninum, upon the round worm.

Some of the direct anthelmintics are purgative also in their action, *e.g.* kamala; but the use of others requires to be followed by that of a cathartic. The worm-preventives are medicines which give tone to the intestinal membrane, and prevent the over-secretion of mucus, which forms a nidus in which the entozoa increase and lodge. Quassia and nux vomica are probably vermicides as well as intestinal tonics.

Therapeutic application. Anthelmintics are employed for the following purposes:—

1. The direct, or vermicides, to destroy any worms present in the alimentary canal.

2. The indirect, or vermifuges, to expel any worms, living or dead.

3. The worm-preventives are administered after the expulsion of worms, to fortify the body and prevent their return.

The direct anthelmintics should be taken when the patient has fasted for many hours; it is often advantageous to give a cathartic several hours before and also three or four hours after; the object of these precautions being to enable the drug to come into close contact with the entozoa, and also to cause their expulsion as soon as they are injured or killed.

Thread-worms are best treated by the exhibition of anthelmintics in the form of enemata, as they inhabit the lower part of the canal.

Order 5.—Stomachic Tonics.

Stomachic tonics, or stomachics, are medicines which act directly upon the stomach, improve appetite, and aid the digestive function.

1. Calumba.
   Gentian.
   Cascarilla.
   Cusparia.
   Chiretta.
   Quassia.
   Hops.
   Nitric acid.
   Hydrochloric acid.
   Nitro-hydrochloric acid.
2. Nux vomica.
   Strychnine.
   Cinchona bark.
   Sulphate of quinine.
   Hydrochlorate of quinine.
   Sulphate of cinchonine.
   Sulphate of cinchonidine.
   Sulphate of berberine.
   Salts of iron.
3. Pepsin.
   Ox-gall.
   Pancreatin.
4. Aloes.
   Rhubarb.
   Taraxacum.

Effects of Stomachic Tonics. In the above list it will be seen that the included drugs are separated into several groups, and such sub-division is not without practical value. Some stomachics appear to act simply by altering the vascularity of the mucous membrane; others by acting on the nervous system and giving tone to the stomach; a third group, by adding to the digestive principles; and a fourth, by altering the state of the lower portion of the intestinal canal, and thus relieving any morbid condition of the stomach itself.

Therapeutic applications. In cases of simple debility of the mucous membrane of the stomach, caused by long-continued dyspepsia, and by the free use of alcohol, the medicines in the first group are useful.

In atonic indigestion from debility of the nervous system and anæmia, the members of the second group are indicated; iron salts if anæmia is present.

In simple atonic dyspepsia from old age and other causes, pepsin is useful.

When atonic indigestion is combined with a torpid state of bowels and liver, taraxacum, aloetics, and rhubarb, alone or combined with other stomachics, prove of much value.

Order 6.—Stomachic Stimulants or Carminatives.

Carminatives are medicines which act as stimulants to the stomach, causing expulsion of flatulence, also allaying pain and spasm of the intestines.

Ginger.
Capsicum and chillies.
Cardamoms.
Mustard.
Horseradish.
Pepper.
Cinnamon oil.
Nutmeg and oil.
Cloves and oil.
Allspice and oil.
Oil of cajuput.
Valerian.
Anise and oil.
Caraway and oil.
Coriander and oil.
Dill and oil.
Fennel.
Oil of peppermint.
Oil of spearmint.
Ether and acetic ether.

Effects of Carminatives. It will be observed that the majority of the substances in the above list contain a volatile oil, which is aromatic in nature ; some are used as ordinary condiments ; they act as stimulants to the mucous membrane of the stomach and intestines, relieve spasm of the muscular coat, and hence give a greater regularity to the ordinary vermicular action of the canal.

Therapeutic applications. These remedies may be used—

1. In cases of distension and colicy pains of the stomach or intestines from flatulence ; they may be combined with other indicated medicines.

2. As adjuncts to purgatives, the action of which they often assist, at the same time diminishing their griping tendency.

3. Some of these substances are used in order to assist the digestive process, in cases of atonic dyspepsia ; especially capsicum, mustard, ginger, pepper, and horseradish.

Order 7.—Stomachic Sedatives.

Medicines which allay irritation of the stomach and upper part of the intestinal canal, by producing a direct sedative action upon the mucous membrane.

Dilute hydrocyanic acid.
Carbonate, subnitrate, and oxide of bismuth.
Citrate of ammonium and bismuth.
Nitrate of silver.
Oxide of silver.
Oxalate of cerium.
Creasote.
Carbolic acid.
Solution of soda.
Solution of potash.
Bicarbonate of sodium.
Bicarbonate of potassium.
Belladonna.
Stramonium.
Henbane.
Opium.

Effects of Stomachic Sedatives. The remedies in this list differ widely in the character of their action, yet under certain circumstances all of them may be employed to allay pain : some appear to act by their direct sedative influence on the nerves of the mucous membrane, others by their influence on more central parts of the nervous system : in the first class are the bismuth and silver salts, the alkaline preparations, and hydrocyanic acid ; in the second, belladonna, stramonium, henbane, and opium, more especially the last.

Therapeutic applications. The use of stomachic sedatives is indicated—

1. In painful affections of the stomach and duodenum, as in gastrodynia, enterodynia : hydrocyanic acid and belladonna are most useful in these cases.
2. In conditions of the stomach accompanied with pyrosis or water brash : in these cases bismuth salts are peculiarly useful.
3. In vomiting : the selection of the remedy must depend on the condition of the stomach giving rise to this symptom : when there is much increased vascular action and a sub-inflammatory state, prussic acid and alkalies may be given ; when the affection is chronic, creasote and carbolic acid, or nitrate of silver ; in vomiting from pregnancy, cerium salts are stated to be useful.

SUBCLASS 2.—Medicines affecting the respiratory organs and passages.

Order I.—ERRHINES OR STERNUTATORIES

Errhines are medicinal substances which possess the property of exciting a secretion of mucus from the nasal mucous membrane, and this is very frequently accompanied with sneezing.

Tobacco (snuff).
Subsulphate of mercury.
Veratrum viride (in powder).

Effects of Errhines. The effects of errhines are almost sufficiently described in the definition ; it may, however, be remarked that some of these substances merely cause an irritant effect upon the surface to which they are applied, but others, especially strong tobacco, produce a secondary influence upon the system, from the subsequent absorption of the drug.

Therapeutic applications. In great dryness of the mucous membrane of the nasal passages.

In some forms of headache, which are relieved by these remedies, partly on account of the increased secretion of mucus and the consequent unloading of the blood-vessels of the membrane, and partly from the derivative effect which is caused by the irritation of the membrane, and also by the act of sneezing.

Order 2.—Expectorants.

Expectorants are medicinal substances which affect the mucous membrane of the pulmonary passages, and alter the quantity and quality of its secretion.

1. Ammonia (free).
Carbonate of ammonium.
Senega.
Squill.
Benzoic acid.
Benzoate of ammonium.
Benzoin.
Balsam of Peru.
Balsam of Tolu.
Storax.
Ammoniacum.
Galbanum.
Asafœtida.
Myrrh.
Copaiba.
Larch bark.
Tar.
2. Ipecacuanha.
Tartarated antimony.
Oxide of antimony.
3. Vapour of water.
Chlorine.
Iodine.
Creasote.
Carbolic acid.

Effects of Expectorants. The remedies in the above list appear to be of very diverse kinds, and groups may be usefully formed for practical purposes. In the first division, the drugs are more or less stimulant upon the vascular system; in the second, sedative in their action; still, under certain conditions, each produces a desirable change in the mucous secretion from the bronchial tubes. Watery vapour relaxes the membrane; the vapours of chlorine and ammonia act as direct stimulants.

Therapeutic applications. The remedies of the first group are applicable in chronic forms of bronchitis unattended with febrile disturbance; they often increase cough and produce discomfort if fever is present. The drugs in the second group are distinctly sedative upon the vascular system, and are more adapted for the treatment of the early stages of bronchitic inflammation, and when febrile disturbance is present. The vapour of water is useful in many cases, and is most conveniently applied by allowing steam to enter the patient's apartment. Chlorine and ammonia vapour used in the form of inhalation can only be employed in very chronic forms of disease, as likewise the vapour of creasote and carbolic acid.

Order 3.—PULMONARY SEDATIVES.

Pulmonary sedatives are substances which produce a direct sedative effect upon the respiratory organs, frequently diminishing the secretion from the mucous membrane of the bronchial tubes.

Opium.
Morphine.
Conium.
Belladonna.
Stramonium.
Hydrocyanic acid.
Acetate of lead.
Tobacco (in smoke).
Stramonium (in smoke).
Conine (vapour of).
Hydrocyanic acid (vapour of).

Effects of Pulmonary Sedatives. Little more can be stated with regard to the action of these remedies than what is contained in the definition; the primary action of the different members may be of diverse character, but the effects on the pulmonary organs very similar.

Conium, for example, acts as a direct sedative upon the spinal cord; acetate of lead as a direct sedative to the vascular system.

Therapeutic applications. When cough is of an irritative or spasmodic character, hydrocyanic acid, conium, belladonna, and stramonium are useful; also in many cases, opium or morphine.

When the secretion from the mucous membrane is excessive, opium, morphine, and acetate of lead are indicated. These sedatives may frequently be advantageously combined with expectorants of a sedative character, as antimony and ipecacuanha.

When used in the form of inhalation, or when smoked, these remedies are usefully employed in diminishing cough and spasmodic difficulty of breathing, and usually a much smaller amount of the drug is required under these circumstances, as the effect is first and especially produced upon the affected parts.

SUBCLASS 3.—Medicines acting on the function of the skin.

Order 1.—SUDORIFICS OR DIAPHORETICS.

Sudorifics or diaphoretics are medicines or medicinal agents which cause an increase of the function of the skin.

Stimulant Sudorifics.

Free ammonia.
Carbonate of ammonium.
Acetate of ammonium.
Citrate of ammonium.
Nitrite of ethyl.
Alcohol (as wine, or distilled spirits).
Ether.
Chloroform.
Jaborandi.
Guaiacum.
Serpentary.

Sassafras.
Mezereon.
Sarsaparilla.
Dulcamara.
Senega.
Camphor.
Sulphur.
Opium preparations.
Salts of morphine.

Sedative Sudorifics.

Oxide of antimony.
Tartarated antimony.
Ipecacuanha.

Assistant Sudorifics.

Warmth to the surface.
Hot vapour to the skin.
Warm diluents.

Effects of Sudorifics. The function of the skin may be promoted by two apparently opposite kinds of medicines, namely: those which stimulate the vascular system, and those which act as sedatives to the same; hence a convenient subdivision may be usefully adopted—stimulant, and sedative sudorifics.

The ammonium salts, with a vegetable acid, are probably decomposed, and the ammonia partly, at least, eliminated by the skin, thus increasing its function. The volatile oils and resins contained in the stimulating vegetable sudorifics appear to increase the cutaneous capillary circulation, and hence the secreting function is necessarily augmented. Opium in small doses is certainly diaphoretic in its action, and probably stimulant as well. The first are especially indicated in cases in which the circulation is sluggish, whereas the sedative sudorifics are adapted to promote sweating in patients whose skin is hot, and in whom febrile disturbance is present.

The therapeutic agents classed under the head of assistant sudorifics may be usefully combined with both kinds of diaphoretics.

It is probable that the skin has a double function; in the first place it eliminates water from the system by evaporation, and secondly it secretes from the blood certain organic and inorganic matters, in the same way as the kidneys and liver; it is also probable that some sudorifics augment especially the one function, certain of them the other.

Therapeutic application. Sudorific remedies may be used for the following purposes:—

1. To restore the action of the skin in cases in which its function has been checked by cold or other causes.

2. To determine to the surface in febrile cases, as by this means the system becomes relieved both of water and solid excreta.

3. To keep up an increased action of the surface in the different exanthematous diseases, and also in some chronic cutaneous affections.

4. To cause the skin to take on an augmented action, and by

this means to relieve certain other organs, especially the kidneys which may be affected with disease.

5. To cause the skin to act vicariously when the action of other secreting organs is excessive, as in diabetes insipidus, chronic diarrhœa, &c. Combination in the prescribing of sudorifics is often of much service ; this is shown in the instance of the compound ipecacuanha powder, a preparation the value of which long experience has confirmed.

SUBCLASS 4.—Medicines affecting the function of the kidneys and urinary organs.

Orders 1 and 2.—DIURETICS, LITHONTRIPTICS.

Diuretics are medicines which cause an increase in the function of the kidneys, and consequently augment the quantity of the urine.

Lithontriptics are remedies which alter the quality of the urine, and prevent the crystallisation and deposit of the ingredients which form gravel and calculi.

Diuretics.

Sedative.
- Squill.
- Scoparium.
- Tobacco.
- Colchicum.

Stimulant.
- Juniper.
- Turpentine.
- Copaiba.
- Cantharides.
- Nitrite of ethyl.
- Alcohol.

The potassium, sodium, and lithium salts placed under lithontriptics.
Water.
Digitalis.
Counter-irritation to loins.
Depletion from loins.

Indirect Diuretics.

Hydragogue purgatives, as elaterium and elaterin.
Cream of tartar.
Gamboge.

Lithontriptics.

Carbonate of lithium.
Citrate of lithium.
Bicarbonate of potassium.
Citrate of potassium.
Acetate of potassium.
Bicarbonate of sodium.
Phosphate of sodium.
Borax.
Vichy, Vals and Contrexéville waters.

Phosphoric acid.
Citric acid.
Benzoic acid.
Benzoate of ammonium.

Effects of Diuretics and Lithontriptics. It is difficult to separate the first two classes in the heading, because most of the medicines which alter the character of the urine influence likewise its secretion ; and on the other hand those drugs which stimulate the kidneys to increased action, in so doing materially affect the composition of the urine ; furthermore, there is another group of remedies usually classed under the head of diuretics, which may in some degree influence the secretion of urine, but which are practically used on account of their action upon the mucous membrane of the urinary passages; these are divided into a separate order.

It will be observed that the class of diuretics is subdivided, and that the remedies in each subclass differ considerably from each other. In the first subclass are substances which appear to act by their direct action on the renal organs, stimulating them to increased action in their passage through those organs. Many of the saline diuretics, as nitre, salts of potassium, sodium, and lithium, appear to act in this manner, as also certain volatile oils (as juniper), turpentine, alcohol, nitrite of ethyl, and cantharides.

In the second subclass, the action of the drug seems to be of a very different character; digitalis, the principal medicine thus placed, acts as a diuretic, probably through its influence upon the circulation, and it is chiefly in cases of disease, in which deficient secretion is due to the circulation being disturbed, that it proves of value. Tobacco, if ever of service in such cases, probably causes diuresis in the same manner, as also colchicum, scoparium, and squill.

The salts of potassium, sodium, and lithium, are all of them diuretic, but it is found that lithium salts are more powerful in this respect than the corresponding salts of potassium, and potassium salts more so than those of sodium.

Some of the stimulating diuretics, especially cantharides and turpentine, if given in too large doses, or too long persevered in, produce strangury and the presence of albumen and blood in the urine.

Indirect diuretics are in many cases more advantageously administered than the direct, as the kidneys are often unable to act from congestion or from pressure of fluid contained in the abdomen; and then the free unloading of the vessels by the exhibition of hydragogue purgatives, or local depletion, or the application of counter-irritation to the loins, will promote the secretion of the renal organs more than the mere presence of diuretics in the blood. Cream of tartar, if given as a hydragogue, acts first by unloading the blood-vessels, and as a derivative, subsequently as a direct diuretic, from the absorption of a part of the salt.

Lithontriptics are of at least two kinds; the first and most important group render the urine less acid or alkaline, and enable it to hold the uric acid and urates in solution, or even to dissolve these substances when already deposited. Lithium salts are far more powerfully solvent and diuretic than potassium salts, and potassium salts than those of sodium. Free dilution of the urine by the exhibition of water in considerable quantities, and while fasting, is of much importance, as it aids greatly the power of the lithontriptic. It will be remembered that the alkaline salts with a vegetable acid are decomposed and render the urine equally alkaline with those in which the base is united with carbonic acid. So that, as a rule, citrate of lithium and citrate of potassium may be given instead of the carbonates, without the disadvantage of being alkaline to the stomach.

The second class consists of acid remedies, these are used in cases where the urine is alkaline. Benzoic acid and benzoate of ammonium appear in the urine as hippuric acid. Benzoic acid is probably more potent in diminishing the alkaline state of urine than any of the other acids. The mineral acids, with the exception of phosphoric acid, cannot often be given in sufficient quantities to produce much influence upon the reaction of the urinary secretion, although they often cause irritation of the bladder when this organ is affected. Benzoate of sodium is very useful in cases where there is a tendency to deposit uric acid, for the hippurate which then occurs in the urine, has considerable power of preventing uric acid from being deposited.

Therapeutic applications. Diuretics are employed for the following purposes :—

1. To cause an increased flow of urine when the renal secretion is deficient. The selection of the diuretic must depend on the cause of the diminished secretion. Sometimes a stimulant medicine is required, at other times one of a sedative character. In cases of dropsy these medicines are peculiarly indicated.

2. Diuretics are given with an idea of causing elimination of poisons from the blood ; and also of matters formed in disease.

3. Diuretics are also administered for the purpose of producing a large flow from the kidneys, so as to enable the secreted urine to hold in solution substances which would otherwise crystallise in the urinary passages and form gravel and calculi.

Linthontriptics are administered to alter the character of the urine in cases of gravel and calculus ; such of these medicines as cause an alkaline condition are indicated where there is a tendency to deposit either uric acid or some little soluble urate ; and those which make the urine more acid, in cases of phosphatic deposits when an alkaline state of the secretion is present.

Order 3.—Medicines which act specially upon the mucous membrane of the urinary organs.

Pareira brava. Uva ursi. Buchu. Benzoic acid. Benzoate of ammonium. Balsam of Peru.	Acting chiefly on the bladder.
Copaiba. Cubebs. Oil of Sandal wood. Turpentine.	Acting chiefly on the urethra.

Effects of the above remedies. It is difficult to assign a name for the medicines in the above order, but for practical purposes it is important that such a grouping should be made. These remedies certainly appear to produce a distinct and specific action upon the mucous membrane of the urinary passages: some act more upon the bladder itself, some on the urethra. In the case of benzoic acid and benzoate of ammonium, as well as of balsam of Peru, the benzoic and cinnamic acids become converted into hippuric acid, and alter the state of the mucous membrane, and also the character of the urine, rendering it more acid in reaction, and more stimulating in its properties.

Therapeutic applications. These remedies are used in disordered conditions of the bladder and urethra;—those affecting the bladder in chronic inflammation of the mucous membrane of that organ, often accompanied with alkaline urine; those influencing the urethra, in gonorrhœa and gleet.

SUBCLASS 5.—Medicines whose action is upon the generative organs.

Order I.—EMMENAGOGUES AND ECBOLICS.

Emmenagogues are remedies which are supposed to have the power of exciting the catamenial flow when this is suppressed from any cause; and ecbolics are substances which cause contraction of the uterus, and the expulsion of its contents.

Direct Emmenagogues.

Ergot.
Savin.
Rue.
Asafœtida.
Castor.

Indirect Emmenagogues.

Ferruginous salts.
Aloes.
Colocynth.
Other strong purgatives.

Ecbolics.

Ergot.
Digitalis.
Savin.
Borax.

Effects of Emmenagogues and Ecbolics. Emmenagogues can be well divided into two classes, those which directly affect the uterus, and those which act by removing the general state of system which prevents the manifestation of the catamenial function. The remedies termed direct emmenagogues produce the first effect; those which are called remote emmenagogues are of a different kind: the first named, the ferruginous salts, act by restoring the blood when in an anæmic state; the rest by stimulating the large bowel, and probably through this the uterus itself. In many cases a combination of direct and indirect emmenagogues is useful, as amenorrhœa and deficient menstruation are frequently combined.

The group of Ecbolics consists of substances acting especially on the uterus itself; but strong purgatives are apt to excite the uterus to contract.

Therapeutic applications. Direct emmenagogues are indicated when the catamenial flow is diminished from a simple sluggishness of uterine action; the remote, especially the ferruginous class, are useful in the majority of cases of amenorrhœa, for by far the most common cause of the affection is poverty of the blood. The combination of iron salts with some purgative acting on the rectum and colon, is in such cases most effectual, for a torpid state of uterus is soon produced by impoverished blood; iron improves the blood, and aloes stimulates the uterus indirectly.

Ecbolics are given when it is desired to cause expulsion of the uterine contents; sometimes this is desirable in cases of disease. These remedies are at times employed for less legitimate purposes.

Orders 2 and 3.—APHRODISIACS AND ANAPHRODISIACS.

Aphrodisiacs are medicines which possess the power of exciting sexual feelings and the venereal function in either sex; and anaphrodisiacs, those which diminish the same.

1. *Direct Aphrodisiacs.*

Nux vomica.
Strychnine.
Cantharides.
Phosphorus.
Indian hemp.
Opium in small doses.

2. *Indirect Aphrodisiacs.*

Blood tonics.
Nervine tonics.
Direct antispasmodics.

1. *Direct Anaphrodisiacs.*

Bromide of potassium.
Bromide of ammonium.
Bromide of sodium.
Hemlock (conium).
Camphor.

2. *Indirect Anaphrodisiacs.*

Alkaline medicines (the continued use of).
All vascular and nervine sedatives.

Effects of Aphrodisiacs and Anaphrodisiacs. The direct aphrodisiacs appear to act through their stimulant action upon the spinal cord; the indirect by improving the tone of the system generally;—the one or the other being indicated according to the peculiarities of the patient. Direct anaphrodisiacs on the other hand act as direct sedatives on the spinal cord; the indirect lower the tone of the general system. The members of the latter group are never administered except for purposes independent of their anaphrodisiac property.

Therapeutic applications. The use of these remedies, and the indications for their employment, are sufficiently shown by their names.

SUBCLASS 6—Medicines which act upon the eyes.

Order 1.—PUPIL DILATORS.
Order 2.—PUPIL CONTRACTORS.

Substances which either dilate or contract the pupil

Pupil Dilators (Mydriatics).

- Belladonna.
- Atropine.
- Stramonium.
- Henbane.
- Cocaine.

Pupil Contractors (Myositics).

- Calabar bean.
- Opium.
- Salts of morphine.
- Some other alkaloids in opium.
- Resin of opium.

Effects of the above Substances. The substances in the above list which dilate the pupil, also paralyse the adjusting power of the eye. They act in the same manner whether applied on or near the eye itself, or taken internally. Those which contract the pupil also produce myopia, or short-sightedness, by causing spasm of the ciliary muscle. Calabar bean acts both when applied locally and after absorption from the stomach. Opium on the contrary, has no influence when applied to the eye, but only after its absorption into the general system; its action is probably upon the third nerve, through the nervous centres.

Therapeutic applications. These substances are used by the ophthalmic surgeon. Atropine to dilate the pupil for purposes of examination, and to prevent adhesion of the iris in cases of iritis. Calabar bean is used to counteract the effects of atropine in the above-mentioned application of that drug, and occasionally for other purposes. Cocaine is used to cause local anæsthesia in operations on the eye.

DIVISION II.

External remedies; or medicines which act locally, and are not employed to affect the constitution by becoming absorbed.

Order 1.—IRRITANTS.

Group 1. Rubefacients.
2. Epispastics, Vesicants or blistering agents.
3. Pustulants.

The substances included under the head of irritants all agree in causing irritation of the skin or other parts to which they are applied, but they differ considerably in the amount of irritation which they produce, and the peculiarities in their action are sufficient to cause them to be arranged into characteristic groups, a division not merely of scientific interest, but of practical importance.

1. *Rubefacients.*

Free ammonia in the form of weak solution of ammonia.
Compound camphor liniment.
Ether, alcohol, and chloroform, when evaporation is prevented.
Mustard cataplasm.
Volatile oil of mustard.
Cajuput oil.
Oil of turpentine.
Mezereon.
Capsicum.
Iodine.
Mercurial salts.

2. *Epispastics.*

Cantharides (blister plaster).
Ethereal solution of cantharides (blister liquid).
Cantharidin.
Glacial acetic acid.

3. *Pustulants.*

Croton oil.
Tartarated antimony.
Nitrate of silver (strong solution of).

Effects of Irritants. When an irritant is applied to the skin, the amount of action determines much the character of the effect: at first, redness of the skin is produced; if the action is greater, blistering takes place from the cuticle being separated, by the effusion of a serous fluid under the cuticle; and if still more intense, pustulation ensues from the true skin being more deeply implicated and matter thrown out. Some of the substances named in the list can be made to produce more than one of these effects; for example, ammonia, if applied in a very diluted state, causes merely redness; if stronger, blistering of the skin; and even pustulation is now and then caused by its long-continued application in a very concentrated form: the same remark applies to glacial acetic acid. Tartar emetic and croton oil almost always lead to the production of pustules if any marked action is induced: cantharides, on the other hand, usually causes a full epispastic effect.

Therapeutic applications. The different kinds of irritants are employed to effect various ends.

1. They are employed as counter-irritants; that is, for the purpose of relieving inflammation or disordered action of internal parts, by the derivative effect upon a less important part, the skin: all irritants act more or less in this manner.

2. Some irritants, namely epispastics, relieve not only by producing counter-irritation, but also by causing an effusion of fluid from the vessels of the affected part or its neighbourhood; this effect is often of much value, even far above that of mere counter-irritation.

3. The pustulants induce a still deeper action, and are sometimes of greater value than vesicants, especially in the treatment of deep-seated and chronic affections.

4. Some of the drugs in the above list are used for their direct effect on diseased parts, as in skin affections of various kinds; and some of them, as the mercurial and iodine preparations, probably induce a specific effect as well as mere local irritation.

Order 2.—External or Local Sedatives.

External sedatives are substances which produce a direct sedative effect upon the part to which they are applied; some, the local anæsthetics, causing complete loss of sensibility.

Hydrocyanic acid.
Belladonna.
Atropine.
Opium.
Morphine salts.
Solution of subacetate of lead.
Acetate of lead.
Salts of bismuth.
Creasote.
Carbolic acid.

Local Anæsthetics.

Aconite.
Aconitine.
Veratrine.
Menthol.
Iodoform.
Ether spray.
Ice.
Cocaine.
Bisulphide of carbon.

Effects of External Sedatives. Practically it may be said that all hese substances act as sedatives upon the part to which they are applied, but in their mode of action they differ considerably; some, as cocaine, hydrocyanic acid, aconite, and veratrine, produce a direct sedative effect upon the nerves ; some, as belladonna, and atropine, probably effect their object through the vessels. The local anæsthetics act, some by contracting the vessels and stopping for a while the circulation, thus producing a diminution or complete loss of the power of sensation in those parts to which they are applied.

Therapeutic applications. These remedial agents are employed—

1. To relieve irritation and inflammatory action.
2. To allay neuralgic or other pain in the affected parts.
3. To produce loss of sensation, and so allow operations to be performed without pain.

Order 3.—EMOLLIENTS.

Substances which soften the part to which they are applied, and soothe and diminish irritation.

Warm water.

Starchy and Mucilaginous substances.

Flour.
Bread.
Oatmeal.
Linseed.
Gum.
Honey.
Figs.
Starch.
Collodion.

Oily and Fatty Substances, as
Linseed oil.
Almond oil.
Olive oil.
Lard.
Suet.
Wax.
Spermaceti.
Glycerine.
Hard and soft paraffin.

Albuminous and Gelatinous Substances.
Isinglass.
White of egg.

LEEDS SCHOOL OF MEDICINE

Effects of Emollients. The action of these substances appears to be partly of a physical and partly of a physiological character, and need not be dwelt upon. When used internally, they affect the mucous membranes of the alimentary canal, being then commonly termed *Demulcents.*

Therapeutic applications. These remedial agents are used to soothe parts which are irritated or inflamed, and to shield them from the action of the air or any foreign influences.

Order 4.—LOCAL ASTRINGENTS AND STYPTICS.

Substances which brace up or produce an astringent effect upon the parts to which they are applied; they are called styptics when used to arrest hæmorrhage.

Dilute sulphuric acid.
Tannic acid.
Gallic acid.
Nut galls.
Oak bark.
Catechu.
Kino.
Rhatany.
Matico.
Alum.
Lime water.
Subacetate of lead.
Acetate of lead.
Carbonate of lead.
Sulphate of zinc.
Acetate of zinc.
Oxide of zinc.
Sulphate of iron.
Perchloride of iron.

The application of cold, as ice, &c.

Effects of Local Astringents and Styptics.—The same as those of the general astringents; and, as will be seen by the list, the same substances are employed.

Therapeutic applications. These remedial agents are employed—

1. To arrest hæmorrhage by application to the part.

2. To check discharges, either from an increase of normal secretion, or diseased secretion; often used in the form of injection to affect mucous membranes, as in leucorrhœa and gleet.

3. To give tone when applied to prolapsed parts.

4. To produce an alterative effect upon the skin in various forms of cutaneous disease.

Order 5.—Caustics and Escharotics.

Substances which destroy the parts with which they come in contact; the stronger caustics produce an eschar, and are termed escharotics.

Sulphate of copper.
Nitrate of copper.
Red oxide of mercury.
Nitrate of silver.
Chloride of antimony.
Chloride of zinc.
Glacial acetic acid.
Carbolic acid.
Salicylic and hydrochloric acid.
Nitric acid.
Acid nitrate of mercury.
Arsenic.
Corrosive sublimate.
Chromic acid.
Bromine.
Sulphuric acid.
Caustic lime.
Caustic soda.
Caustic potash.

Effects of Caustics and Escharotics. All the substances contained in the above list produce a chemical rather than a physiological action upon the parts to which they are applied. On dead animal tissues they act even more powerfully than on the living body. The effect of these substances differs considerably, as will be seen by studying their chemical properties; some act by their intense affinity for water, others by forming compounds with the albuminous principles of the tissues.

Therapeutic applications. These remedial agents are employed—

1. To destroy poison, as of serpents, rabid animals, and syphilis.
2. To remove exuberant and morbid growths, as in excessive granulations, polypi, and cancerous deposits; also to improve the character of ulcerated surfaces.
3. To act on the healthy skin so as to form issues and to open abscesses.

DIVISION III.

Order I.—ANTIDOTES.

Antidotes are substances which counteract the injurious influence of poisons introduced into the body.

Antidotes may be divided into direct and indirect antidotes; the former neutralising or destroying the injurious action of the poison on meeting it in the system; the latter counteracting the injurious physiological effects of the drug. The following is a list of some of the most important antidotes to the chief poisons.

Direct Antidotes.

Poisons.	*Antidotes.*
Acids	Magnesia, chalk, and dilute solutions of alkaline carbonates.
Alkalies and alkaline earths	Vinegar and water. Oil.
Alkaloids	Animal charcoal.
Antimony	Preparations containing tannin in solution, as decoction of cinchona.
Arsenic	Hydrated peroxide of iron.
Barium salts	Soluble sulphates.
Chlorine	Ammonia. Magnesia.
Cyanides and hydrocyanic acid	Solution of chlorine. Mixed oxides of iron.
Iodine	Starch.
Lead salts	Sulphate of sodium or magnesium.
Mercurial salts	White of egg.
Opium	Animal charcoal absorbs morphine, &c.
Silver, nitrate of	Chlorides of alkalies (common salt).
Zinc, sulphate of	Dilute solution of carbonate of sodium.

Indirect Antidotes.

Substances which physiologically counteract the baneful influence of the respective poisons.

Order 2.—DISINFECTANTS AND ANTISEPTICS.

Disinfectants are substances which destroy the specific contagia of disease, and remove disagreeable gases and odours by decomposing both them and the bodies from which they proceed.

The following disinfectants are contained in the British Pharmacopœia :—

Chlorine.
Iodine.
Bromine.
Chlorinated lime.
Chlorinated soda.
Peroxide of hydrogen.
Permanganate of potassium.
Sulphate of iron (proto-sulphate).
Charcoal.

Antiseptics are substances which prevent chemical change by destroying the *activity* of infecting matters, without of necessity altering their chemical composition. In this restricted sense they have been named colytics (from *κωλύειν*, to prevent).

Antiseptics.

Carbolic acid.
Creasote.
Salicylic acid.
Iodoform.
Boric acid.
Thymol.
Menthol.
Alcohol.
Sulphurous acid.
Sulphites of alkalies and earths.
Chloride of sodium.
Corrosive sublimate.
Perchloride of iron.
Chloride of zinc.
Sulphate of copper.
Arsenic.

Of the substances in the above list, many, as chloride of zinc, perchloride of iron, chloride of sodium, corrosive sublimate, arsenic, and sulphate of copper, have very little influence on animal poisons, but simply preserve organic matters from decomposition. Free sulphurous acid has the advantage of being not only an antiseptic but also a deodoriser.

The essential oils also possess some preservative powers.

APPENDIX.

I.

MINERAL WATERS.

In our remarks on Mineral Waters we shall endeavour to give the Practitioner and Student a practical summary of the subject: confining our attention to such places of resort frequently visited by sufferers in our own country.

All water found on the earth's surface contains more or less foreign matter. The purest is melted snow or rain water, collected at a distance from towns. The most common impurities are salts of calcium, as the sulphate, and the carbonate held in solution by an excess of carbonic acid. Besides these, water always contains a certain amount of dissolved gases, as common air, or rather air rich in oxygen and carbonic acid. The nature of the saline impurities varies much with the kind of soil through which the water flows; for some substances, as silex, are almost insoluble, whereas, when the water is impregnated with carbonic acid, gypsum, and more particularly limestone, dissolve to a considerable amount. When these foreign matters exist in water to an extent sufficient to impart a sensible taste, it is called a mineral water: these have been divided into several classes, depending on their chemical composition.

The following are the most important divisions:—1. Ferruginous waters. 2. Sulphur waters. 3. Alkaline waters. 4. Acidulous or carbonated saline waters. 5. Aperient saline waters. 6. Indifferent thermal waters. 7. Miscellaneous waters.

1. *Ferruginous or Chalybeate Waters.*

These waters owe their efficacy to the iron contained in them; in many waters traces of iron exist, but such only are named chalybeate as possess sufficient of this metal to endow them with decided medicinal powers. In some springs, the iron exists in the form of carbonate held in solution by excess of carbonic acid; when such are exposed to the air, peroxide of iron is soon formed and deposited; others contain sulphate of iron, some chloride of iron. By far the most important are the ferruginous waters in which the iron is in the form of a carbonate, and kept in solution by an excess of carbonic acid, which gives to them a sparkling character, and makes them sit more easily on the stomach.

The most celebrated ferruginous springs are those of Schwalbach (Nassau), Spa (Belgium), St. Moritz (Upper Engadine); formerly Pyrmont was fashionable; these waters all effervesce.

In England, the chalybeate waters of Tunbridge Wells are best known, but they do not effervesce. There are ferruginous springs in several other watering-places, as at Harrogate and Buxton, &c.

Therapeutics. The chalybeate waters are indicated in anæmic states of the system, and are often useful when the ordinary medicinal preparations of iron fail to do good.

Ferruginous baths are employed at Schwalbach, Spa, and St. Moritz, the water being artificially warmed; they produce a peculiar sensation of pricking of the skin from the carbonic acid; but it is doubtful if the iron is absorbed into the system.

The ferruginous water of Orezza (Corsica) is imported into this country.

2. *Sulphur Waters, called also Sulphuretted or Hepatic Waters.*

These waters are all rich in sulphuretted hydrogen, which is held in solution; besides which most of them contain soluble sulphides as of sodium; their odour is peculiar, and their taste also. When exposed to the air, the waters containing the sulphides become more or less milky from the setting free of a portion of the sulphur.

In Britain, the best known are the waters of Harrogate, Strathpeffer, Moffat, Lisdunvarna in Ireland, and Llandridnod in Wales. These waters are all cold.

On the Continent, the waters of Aix-les-Bains (Savoy), Aix-la-Chapelle and its neighbouring village, Borcet, Bagnères de Luchon, Baréges (at a great altitude and with a short season), also Baden in Switzerland.

There are many other places on the Continent in which there are sulphur springs, as in Spain; also in the United States of America.

Most of the sulphur waters on the Continent are hot.

Therapeutics. Sulphur waters act as stimulants and alterants on the skin and various mucous membranes, also on the liver and uterus.

They are indicated in the treatment of skin diseases, as psoriasis, eczema, &c., also in chronic laryngeal and bronchial affections. In chronic muscular affections they are useful, and the author from a long and extensive experience can confidently state that in rheumatoid arthritis the treatment at Aix-les-Bains is most useful. Probably, the peculiar mode of their administration adds much to their value. Sulphur waters are used internally, and likewise in the form of baths of different kinds, and Massage is frequently employed in the douche bath, especially at Aix-les-Bains.

3. *Alkaline Waters.*

In Britain there are no alkaline springs which can be resorted to with advantage.

The most celebrated alkaline waters on the Continent are those of Vichy, Vals, Ems, Contrexéville, Royat, Wildungen, and Schlangenbad. The waters from all these places are imported. The places most frequented for the course are Vichy, Ems, Contrexéville, and Royat. Vichy and Vals waters owe their alkaline property to the presence of large amounts of bicarbonate of sodium. Ems waters are less alkaline. In the waters of Contrexéville there are several salts besides the bicarbonate, as salts of lithium, calcium, and magnesium.

Therapeutics. The alkaline waters are employed to increase the alkalinity of the blood, and render the urine less acid; also as alteratives to different organs, as the liver and digestive organs.

Vichy waters are used much in gout, also in uric acid gravel, and irritable states of the bladder and urinary tract.

Schlangenbad is resorted to in some cutaneous affections; the water is supposed to have a peculiar soothing influence on the skin; it is usually looked upon as belonging to the indifferent thermal waters. The Ems treatment is used much in pulmonary affections, as bronchitis; the village is almost surrounded by hills. Contrexéville has acquired, and the author thinks deservedly so, a high reputation in the treatment of calculi in the bladder and its reputation is much increasing in this country.

4. *Acidulous or Carbonated Saline Waters.*

These waters contain a large amount of carbonic acid, which gives them their acidity, and causes them to sparkle ; they usually hold in solution carbonates of calcium, sodium, and magnesium ; the first often becomes deposited on exposure to the air from the escape of the carbonic acid, which acted as its solvent. The most celebrated of these waters are those of Bath, Neuenahr, Kissingen, Wiesbaden, and Tarasp.

Therapeutics. The waters are useful in atonic forms of dyspepsia, especially those of Kissingen, Bilin, and Baden-Baden, which last are rich in salts of lithium ; the free carbonic acid improves the tone of the stomach ; they also, from the alkaline salts they possess, act as alteratives, increasing the secretion of the kidneys and skin, and are valuable in chronic visceral diseases, gout, rheumatism, and some calculous affections.

5. *Saline Aperient Waters.*

These waters contain various salts, as sulphates of sodium and magnesium, together with small amounts of chlorides of the same metals ; also small amounts of carbonates of calcium and sodium.

The chief waters of this class in England are those of Cheltenham and Leamington, formerly much resorted to. On the Continent those of Carlsbad (hot), Marienbad, Homburgh (Elizabeth spring), and Franzensbad.

Therapeutics. The saline purging waters are indicated in cases where congestion of the portal system is present : as in different forms of hepatic disease and in gouty states connected with plethora and the excessive secretion of uric acid.

6. *Indifferent Thermal Waters.*

These waters contain a proportion of mineral matter so small as to be therapeutically insignificant; they appear to be very rich in nitrogen gas. Their temperature varies from 70° to 150° F. (21°·2 to 65°·6 C.). To this group belong the waters of Gastein, Wildbad, Schlangenbad, Teplitz, Plombières, Bagnères de Bigorre, Pfaffers and Ragatz, to which latter place the water is brought by pipe from Pfaffers. In England, Buxton is most frequently resorted to.

Therapeutics. These waters are chiefly used in the form of baths, exerting a sedative influence in various affections of the nervous system, such as hysteria, some forms of neuralgia and functional paralysis, and chronic forms of asthenic gout and rheumatism. They are likewise employed in the treatment of uterine disorders. Taken internally, they are useful in chronic catarrh of the stomach, gravel, and other urinary affections, causing for the most part diuresis.

7. *Miscellaneous Waters.*

In England the waters of Woodhall Spa and Purton are noted for the iodine and bromine they contain; there are also the brine springs or waters of Droitwich and Nantwich.

On the Continent, the waters of Kreuznach are rich in iodine and bromine, and those of Bourbole in arsenic.

Many waters are imported into this country, the places themselves not being resorted to by patients, as the purging waters of Püllna, Friedrichshall, Hunyado Janos, also the Æsculap water.

Vals waters are much used in this country, as well as Vichy; the sulphur waters of Challes; also the ferruginous waters of Schwalbach, Spa, and Orezza; besides the Table Waters, as Seltzer, Apollinaris, St. Galmier, Rosbach, and other waters.

II.

ARTICLES EMPLOYED IN CHEMICAL TESTING.

ACETATE OF SODIUM. $NaC_2H_3O_2,3H_2O$. Employed in the preparation of the test solution; also in the preparation of acetic ether.

BENZOL. A colourless volatile liquid, obtained from coal tar, and consisting chiefly of benzol, C_6H_6. Sp. gr. about 0·850. Employed in the preparation of benzolated amylic alcohol; also as a solvent.

BENZOLATED AMYLIC ALCOHOL. Mix together three volumes of benzol and one of amylic alcohol. Decant the supernatant fluid from any deposited water. Employed in estimating the amount of total alkaloids present in red cinchona bark.

CHLORIDE OF BARIUM. $BaCl_2,2H_2O$. Employed in the preparation of the test solution.

COPPER FOIL. Pure metallic Copper, thin and bright. Employed in Reinsch's test for arsenic or antimony.

ETHYLIC ALCOHOL. Absolute Alcohol. C_2H_6O. Employed as a solvent, also in testing chloroform.

FERRICYANIDE OF POTASSIUM. *Synonym.* Red Prussiate of Potash. $K_6Fe_2C_{12}N_{12}$. Employed in the preparation of the test solution. *Test.* Its aqueous solution gives no precipitate with a dilute solution of a pure ferric salt.

GOLD, FINE. Gold, free from metallic impurities. Employed in the preparation of the test solution of perchloride of gold, a test for atropine.

HYPOSULPHITE OF SODIUM. *Synonym.* Thiosulphate of sodium. $Na_2S_2O_3,5H_2O$. Employed in the preparation of the volumetric solution. *Test.* 24·8 grains decolorise 1000 grain-measures of the volumetric solution of iodine.

INDIGO. C_8H_5NO. A blue pigment prepared from various species of Indigofera. Employed in the preparation of the test solution of sulphate of indigo.

ISINGLASS. The swimming bladder or sound of various species of Acipenser, prepared, and cut into fine shreds. Employed in the preparation of the test solution.

LITMUS. A blue pigment prepared from various species of Rocella. Employed in the preparation of the test solution.

LITMUS PAPER, BLUE. Unsized white paper steeped in solution of litmus, and dried by exposure to the air. A test for the detection of free acid.

LITMUS PAPER, RED. Unsized white paper steeped in solution of litmus which has been previously reddened by the addition of a very minute quantity of acid, and dried by exposure to the air. A test for the detection of free alkali.

OXALIC ACID OF COMMERCE. Oxalic Acid ($H_2C_2O_4$, $2H_2O$), not quite pure. Employed, after purification, for the preparation of the volumetric solution, and of oxalate of ammonium.

OXALATE OF AMMONIUM. $(NH_4)_2C_2O_4,H_2O$.

Prep. (Oxalic acid, one ounce ; boiling distilled water, eight fluid ounces ; carbonate of ammonium, a sufficiency. The boiling solution of oxalic acid is neutralised with carbonate of ammonium, filtered, and set aside to crystallise on cooling.) Employed in the preparation of the test solution.

PETROLEUM SPIRIT. *Synonyms.* Benzoline ; Petroleum Ether. A colourless very volatile and highly inflammable liquid obtained from petroleum, and consisting of a mixture of the lower members of the paraffin or marsh-gas series of hydrocarbons.

Boiling point 122° to 140° F. (50° to 60° C.). Sp. gr. about 0·670 to 0·700. Employed as a test for copaiba.

PHENOL-PHTHALEIN. Produced by the reaction of phenol and phthalic anhydride. Its tincture yields an intense red colour with potash or soda, hence may be used as an indicator of the termination of volumetric reactions, especially those with organic acids.

PLATINUM BLACK. Platinum in a state of minute division, obtained by adding excess of carbonate of sodium and some sugar to solution of perchloride of platinum, and boiling until a black precipitate is formed, which is washed and dried. Employed as a test for amylic alcohol, which it slowly oxidises to valerianic acid.

PLATINUM FOIL. Employed in the preparation of the test solution of perchloride of platinum.

SUBACETATE OF COPPER OF COMMERCE. Verdigris. Employed in the preparation of the test solution of acetate of copper.

SULPHATE OF COPPER, ANHYDROUS. $CuSO_4$. Sulphate of copper deprived of its water by a temperature of 400° F. (204°·4 C.). A yellowish white powder, which becomes blue when moistened with water. Employed to prove the absence of water in ethylic alcohol.

SULPHIDE OF IRON. FeS. Prepared by combining its elements in proper proportions by the aid of heat. Small quantities may be produced by applying the end of a rod of iron, heated to whiteness at a blacksmith's forge, to the end of a roll of sulphur, and allowing the sulphide of iron, as it is formed, to run into a vessel of water. Employed in the preparation of sulphuretted hydrogen.

SULPHURETTED HYDROGEN. H_2S. Prepared by the action of dilute sulphuric acid on sulphide of iron. When the gas is employed, either in chemical testing or in the preparation of acidum hydrobromicum dilutum, it should be washed by being passed through water. Sulphuretted hydrogen gives *yellow* precipitates in neutral solutions containing arsenious or arsenic acid, which are soluble in ammonia and sulphydrate of ammonium, but insoluble in excess of hydrochloric acid; it also yields a *yellow* precipitate in solutions of the persalts of tin; the precipitate is however soluble in hydrochloric acid. It gives brown or black precipitates in *acid solutions* of the following metallic bases:—mercurous and mercuric salts, salts of silver, lead, copper, bismuth, protoxide of tin, gold, and platinum. The precipitate with the mercuric salts is at first yellow, but becomes black with excess of sulphuretted hydrogen. Salts of the following metals (contained in the Phamacopœia) are not precipitated by hydrosulphuric acid in *acid* solutions:—the ferrous and ferric salts, oxide of zinc, and manganese.

TIN, GRANULATED. Grain tin, reduced to small fragments by fusing and, immediately the tin is melted, pouring it in a thin stream into cold water. Employed in preparing the test solution of stannous chloride.

TURMERIC. The dried rhizome of Curcuma longa. Employed in the preparation of turmeric tincture.

TURMERIC PAPER. Unsized white paper steeped in tincture of turmeric and dried by exposure to the air. Introduced for testing alkalies; when the yellow colouring matter of turmeric is brought in contact with alkaline solutions, its colour is changed to reddish-brown. It is also employed as a test for boric acid; when moistened with an aqueous solution of this acid slightly acidified with hydrochloric acid, it becomes brownish-red on gently drying, and this colour changes to a greenish, if solution of potash be added.

TINCTURE OF TURMERIC. Prepared by macerating for seven days an ounce of bruised turmeric with six fluid ounces of rectified spirit, then filtering. Employed in the preparation of turmeric paper.

III.

TEST-SOLUTIONS

FOR QUANTITATIVE AND QUALITATIVE ANALYSES OF SUBSTANCES CONTAINED IN THE PHARMACOPŒIA;

WITH AN EXPLANATION OF THEIR MORE IMPORTANT APPLICATIONS.

SOLUTION OF ACETATE OF COPPER.

Prep. By digesting half an ounce of subacetate of copper in fine powder with one fluid ounce of acetic acid diluted with half a fluid ounce of water, at a temperature not exceeding 212° F. (100° C.), with repeated stirring, till a dry residue is obtained. Then dissolving this in sufficient water to make the solution measure five ounces. In this process the subacetate, $\mathbf{Cu(C_2H_3O_2)_2,CuO}$, is made to assume another equivalent of acetic acid, and is thus converted into the acetate, $\mathbf{Cu(C_2H_3O_2)_2}$.

Use. It is used in the Pharmacopœia for detecting the presence of *butyric acid in valerianate of zinc,* the valerianate being often adulterated with the butyrate, to which a few drops of oil of valerian are added to simulate the odour of valerian. The suspected salt is first distilled with sulphuric acid, and the solution of acetate of copper added to the distillate; pure valerianic acid gives under these circumstances no immediate precipitate, but if any butyric acid is present, a bluish-white precipitate of butyrate of copper is produced. The butyrate of copper is a sparingly soluble salt, and is represented by the formula $\mathbf{Cu(C_4H_7O_2)_2}$.

SOLUTION OF ACETATE OF POTASSIUM.

Prep. Made by dissolving half an ounce of acetate of potassium ($\mathbf{KC_2H_3O_2}$) in five fluid ounces of distilled water.

Use. This solution is employed to *distinguish between tartaric and citric acids.* When added to a solution of citric acid no precipitate takes place, but with tartaric acid, the sparingly soluble bitartrate of potassium is precipitated ($\mathbf{KHC_4H_4O_6}$).

SOLUTION OF ACETATE OF SODIUM.

Prep. By dissolving half an ounce of acetate of sodium ($\mathbf{NaC_2H_3O_2,3H_2O}$) in five fluid ounces of distilled water.

Use. Employed in testing *Calcii Phosphas* (*quod vide*). The acetate of sodium is added to the phosphate of calcium dissolved in nitric acid ; the latter is thus neutralised, and free acetic acid takes its place. On adding oxalate of ammonium or perchloride of iron, a white precipitate of oxalate of calcium or phosphate of iron is thrown down ; both these precipitates would have been dissolved by the nitric acid, whereas they are insoluble in acetic acid.

SOLUTION OF ALBUMEN.

Prep. The white of one egg is well triturated in a mortar with four ounces of distilled water, and filtered through clean tow, previously moistened with distilled water.

Use. This is used for testing *phosphoric acid.* The phosphoric acid, which is the tribasic variety ($\mathbf{H_3PO_4}$), is not precipitated by albumen ; this test distinguishes it from the monobasic phosphoric acid ($\mathbf{HPO_3}$) ; both the monobasic and bibasic ($\mathbf{H_4P_2O_7}$) varieties give white precipitates with nitrate of silver, but the latter does not precipitate albumen, while the former does. *Creasote* and *carbolic acid* both coagulate the solution of albumen.

SOLUTION OF AMMONIO-NITRATE OF SILVER.

Prep. A quarter of an ounce of nitrate of silver in crystals ($\mathbf{AgNO_3}$) is dissolved in eight fluid ounces of distilled water, and half an ounce or a sufficiency of solution of ammonia added, so as nearly to redissolve the precipitate which is at first formed. The ammonio-nitrate of silver is represented by the formula ($\mathbf{AgNO_3,2NH_3}$).

Use. This is directed to be used for testing *arsenious acid* and *phosphoric acid,* with the aqueous solutions of which it gives yellow precipitates of arsenite and phosphate of silver, which are soluble in excess both of ammonia and nitric acid.

SOLUTION OF AMMONIO-SULPHATE OF COPPER.

Prep. By dissolving half an ounce of crystallised sulphate of copper in eight fluid ounces of distilled water, and adding solution of ammonia to the solution until the precipitate formed at first is nearly dissolved, filtering and adding sufficient distilled water to the clear solution to make it measure ten fluid ounces.

The ammonio-sulphate of copper is represented by the formula $[CuSO_4,(NH_4)_2SO_4,6H_2O]$.

Use. Ammonio-sulphate of copper may be employed in lieu of ammonio-nitrate of silver as a test for the presence of *arsenious acid*, with which it gives a green precipitate (Scheele's green) which is soluble in excess of ammonia.

SOLUTION OF AMMONIO-SULPHATE OF MAGNESIUM.

Prep. By dissolving one ounce of sulphate of magnesium, and half an ounce of chloride of ammonium, in eight fluid ounces of distilled water, afterwards adding half a fluid ounce of solution of ammonia, and enough distilled water to make up the bulk to ten fluid ounces.

The composition of the ammonio-sulphate of magnesia is represented by the formula $[MgSO_4,(NH_4)_2SO_4,6H_2O]$.

Use. The solution is used for testing *phosphate of ammonium.* When added to a solution of that salt, a crystalline precipitate of ammonio-magnesian phosphate is formed; this is also known as the triple phosphate, and has the composition $(MgNH_4PO_4, 6H_2O)$; it is very sparingly soluble in pure water, and insoluble in water containing chloride of ammonium or ammonia, but readily soluble in acids. When dried and heated to redness, this salt yields 35·7 per cent. of magnesia, and 64·3 of phosphoric acid.

The solution is also made use of to determine the *presence of phosphoric acid in the phosphate of iron.* For this purpose the salt is dissolved in hydrochloric acid, tartaric acid and excess of ammonia added, and then the test-solution, when the ammonio-magnesian phosphate is precipated. Ammonia would precipitate the iron if added alone, but with the tartaric acid a soluble compound, ammonio-tartrate of iron, is formed, and the iron is thus held in solution

SOLUTION OF BORIC ACID.

Prep. Made by dissolving fifty grains of boric acid ($\mathbf{H_3BO_3}$) in one fluid ounce of rectified spirit.

Use. It is used to test the presence of turmeric in rhubarb. Turmeric becomes of a brown colour when treated with the solution of boric acid, whereas the colouring matter of rhubarb is unaffected by this reagent.

SOLUTION OF BROMINE.

Prep. A solution of ten minims of bromine in five fluid ounces of distilled water.

Use. This solution is employed in testing bromide of potassium, to determine whether any iodide is present. A few drops are added to a solution of the salt mixed with mucilage of starch: if any iodine is present, the blue iodide of starch is formed.

SOLUTION OF CARBONATE OF AMMONIUM.

Prep. Made by dissolving half an ounce of carbonate of ammonium in ten fluid ounces of water and three-quarters of a fluid ounce of solution of ammonia.

Use. Used in testing the carbonate and oxide of zinc. These substances, dissolved in water by the aid of a little nitric acid, give a white precipitate (carbonate of zinc) with the solution of carbonate of ammonium, which is entirely soluble without colour in excess of the reagent. This test serves to distinguish zinc from alumina and the alkaline earths, including magnesium, &c.

SOLUTION OF CHLORIDE OF AMMONIUM.

Prep. By dissolving one ounce of chloride of ammonium in ten fluid ounces of distilled water.

Use. It is used as a test under the heads of Magnesia, Carbonate and Sulphate of Magnesium.

The solution of chloride of ammonium with a little free ammonia is mixed with the solution of the substance to be tested, and phosphate of sodium is afterwards added, when the magnesium present is precipitated in the form of the ammonio-magnesian phosphate. No precipitate of this salt will take place (except in a very concentrated solution) unless chloride of ammonium be present. The precipitates caused in a solution of magnesian salts by potash, soda, and ammonia, and by the carbonate of potassium and sodium, are all soluble in chloride of ammonium.

SOLUTION OF CHLORIDE OF BARIUM.

Prep. An ounce of chloride of barium, in crystals, dissolved in ten fluid ounces of water.

Use. Chloride of barium forms with sulphuric acid and the soluble sulphates a white precipitate of sulphate of barium, a very insoluble compound, scarcely acted upon even by boiling nitric acid. The solution of chloride of barium is used as a test for sulphuric acid and the sulphates, and for this purpose is applied to nearly all the inorganic substances in the list of the Materia Medica, and also to some of the organic.

SOLUTION OF FERRICYANIDE OF POTASSIUM.

Prep. By dissolving a quarter of an ounce of ferricyanide of potassium in five fluid ounces of distilled water.

Use. This solution is used as a test for the ferrous salts, with which it forms a blue precipitate ; with the ferric salts it gives no precipitate, and hence affords a means of distinguishing between the proto- and per-salts of iron.

SOLUTION OF FERROCYANIDE OF POTASSIUM.

Prep. By dissolving a quarter of an ounce of ferrocyanide of potassium (crystals) in five fluid ounces of distilled water.

Use. Ferrocyanide of potassium forms insoluble precipitates with many of the metals, and is used as a test for their presence ; the colour of the precipitate is sometimes sufficient to indicate the nature of the metal present in solution. Thus it gives a blue precipitate with the persalts of iron, a reddish-brown one with those of copper, and a white or nearly white precipitate with protosalts of iron, manganese, zinc, tin, cadmium, lead, bismuth, antimony, mercury, and silver.

SOLUTION OF IODIDE OF POTASSIUM.

Prep. Made by dissolving one ounce of iodide of potassium in ten fluid ounces of distilled water.

Use. The solution of iodide of potassium is used as a test for the presence of lead, in the oxide, the acetate, and the carbonate of that metal. The oxide (litharge) and the carbonate are dissolved in water, with the aid of a little nitric acid, the acetate in distilled water alone, and the solution of iodide of potassium is added ; a bright yellow precipitate of iodide of lead is produced : it is precipitated at first as a yellow powder, sparingly soluble in cold, but more soluble in hot water, the solution as it cools, deposits the iodide in beautiful yellow spangles.

SOLUTION OF ISINGLASS.

Prep. Fifty grains of isinglass, cut into shreds, and five fluid ounces of distilled water, are mixed and digested for half an hour on a water bath with repeated shaking, and the solution filtered through clean tow moistened with distilled water.

Use. The solution is used to distinguish between gallic and tannic acid ; the former gives no precipitate with isinglass, while the latter gives a yellowish-white one.

SOLUTION OF LITMUS.

Prep. Made by boiling for an hour one ounce of litmus, in powder, with four fluid ounces of rectified spirit ; the clear fluid is poured away, and the operation repeated with three ounces of rectified spirit, and a third time with three more ounces of rectified spirit. The residual litmus is digested in distilled water and filtered.

Use. This solution gives a red colour with acids and a blue colour with alkalies. It is used as an indicator of the termination of reactions in numerous volumetric operations.

SOLUTION OF OXALATE OF AMMONIUM.

Prep. Made by dissolving half an ounce of oxalate of ammonium in a pint of water.

Use. The solution of oxalate of ammonium is used for detecting the presence of calcium in solution. It forms, in very dilute neutral or alkaline solutions of the salts of calcium, a precipitate of oxalate of calcium, which is insoluble in acetic acid, but soluble in nitric acid and hydrochloric acid. It is applied for this purpose to test many of the Pharmacopœia substances—tartaric and citric acids, liquor ammoniæ fortior, creta preparata, calcii phosphas, calx, carbonate and citrate of lithium, sulphate of magnesium, and many other substances in the Materia Medica.

SOLUTION OF PERCHLORIDE OF GOLD.

Prep. Made by dissolving, with the aid of heat, sixty grains of fine gold in thin laminæ, in dilute nitro-hydrochloric acid, made by mixing one and a half fluid drachms of nitric acid, six fluid ounces of hydrochloric acid, and four fluid ounces of distilled water; then adding an additional fluid drachm of hydrochloric acid and evaporating at a temperature not above 212° F. (100° C.), until acid vapours cease to be given off; and lastly, dissolving the chloride of gold which remains in five fluid ounces of distilled water.

Use. This solution contains perchloride of gold ($\mathbf{AuCl_3}$), and is employed for the purpose of recognising the alkaloid atropine, which forms with it a double salt, chloride of gold and atropine, crystallising in yellow plumose needles.

SOLUTION OF PERCHLORIDE OF PLATINUM.

Prep. A mixture of a fluid ounce of nitric acid with four fluid ounces of hydrochloric acid, and two fluid ounces of distilled water, are poured upon a quarter of an ounce of platinum foil in a small flask, and digested, more of the acids, mixed in the same proportion, being added if necessary until the metal is dissolved. The solution is transferred to a porcelain capsule, a fluid drachm of hydrochloric acid added, and the whole evaporated on a water bath until acid vapours cease to be given off. The residue is dissolved in five ounces of distilled water and preserved in a stoppered bottle.

Use. This solution is used for testing the presence and absence of potassium compounds in various substances; it forms with potash a double chloride ($\mathbf{2KCl,PtCl_4}$), very sparingly soluble in water, insoluble in ether and alcohol; with sodium compounds on the other hand, no precipitate is formed. With this view it is applied to test potash, sulphate of potassium, bicarbonate and carbonate of potassium, the chlorate, the citrate, the permanganate and the acid tartrate of potassium, the bicarbonate and carbonate of sodium, chloride of sodium, and liquor sodæ chlorinatæ. It is important to remember that it forms a double chloride with ammonium ($2\mathbf{NH_4Cl,PtCl_4}$) as well as with potassium.

The solution of bichloride of platinum is also used as a test for the presence of nicotine in the distillate obtained by distilling tobacco leaves with solution of potash. It forms with that substance a yellow crystalline precipitate, a double chloride of platinum and nicotine.

SOLUTION OF PHOSPHATE OF SODIUM.

Prep. Made by dissolving one ounce of phosphate of sodium, in crystals, in ten fluid ounces of distilled water.

Use. The solution is used under Magnesia, Carbonate and Sulphate of Magnesium, to test the presence of that base, by the formation of the ammonio-magnesian phosphate, as noticed under the solution of chloride of ammonium. Also under Carbonate of Lithium, the chloride of which is precipitated by the solution of phosphate of sodium, as phosphate of lithium.

SOLUTION OF POTASSIO-MERCURIC IODIDE.

Synonym. Nessler's Reagent.

Prep. By dissolving one hundred and thirty-five grains of iodide of potassium and a hundred grains of perchloride of mercury in fifteen fluid ounces of boiling distilled water. To this fluid more aqueous solution of the perchloride of mercury is added until the precipitate produced no longer continues to disappear on well stirring, and a slight permanent precipitate remains. Then two ounces of caustic soda are added. When the latter has dissolved, a little more of the aqueous solution of perchloride of mercury is added, the mixture shaken, allowed to settle, and diluted with distilled water to the volume of one pint. This solution gives a brown colour in presence of free ammonia.

SOLUTION OF STANNOUS CHLORIDE.

Prep. By dissolving one ounce of granulated tin in three fluid ounces of hydrochloric acid, diluted with one fluid ounce of distilled water, with a moderate heat, until gas ceases to be evolved, and subsequently adding sufficient distilled water to make up the bulk to five fluid ounces. The solution, together with the undissolved tin, should be transferred to a well-stoppered bottle.

Use. This is a solution of the protochloride of tin ($SnCl_2$). Protochloride of tin absorbs oxygen and chlorine very readily, and is a powerful deoxidising agent. It reduces to the metallic state the salts of mercury, silver, gold, &c.; and the solution is often employed for precipitating mercury from its combinations. It is used in the Pharmacopœia for this purpose. The ammoniated mercury boiled with the solution of chloride of tin becomes grey, and deposits globules of metallic mercury.

SOLUTION OF SULPHATE OF INDIGO.

Prep. Made from five grains of indigo and ten fluid ounces of sulphuric acid, by digesting the indigo with a fluid drachm of sulphuric acid for an hour, with the aid of the heat of a water-bath, then pouring the solution into the remainder of the acid, and after thoroughly mixing by agitation, allowing any undissolved matter to subside, and decanting off the clear liquid for use.

Use. This solution, which contains the sulphate of indigo, when in contact with free chlorine or bodies containing chlorine in a feeble state of combination, becomes decolorised, hence its value as a test. It is employed under Chlori Liquor, Liquor Sodæ Chlorinatæ, &c.

SOLUTION OF SULPHATE OF IRON.

Prep. Made by dissolving ten grains of granulated sulphate of iron in one fluid ounce of boiling distilled water. It should be recently prepared.

Use. This solution of the protosulphate of iron is employed in testing for nitrates; in contact with nitric acid and oil of vitriol it becomes of a dark purple colour.

It is employed under Acidum Nitricum, Acidum Phosphoricum, Acidum Sulphuricum, Spiritus Ætheris Nitrosi, &c.

SOLUTION OF SULPHATE OF CALCIUM.

Prep. Made by rubbing a quarter of an ounce of plaster of

Paris (sulphate of calcium, dried) in a porcelain mortar with two fluid ounces of distilled water, and then adding the milky fluid to eighteen fluid ounces of water, and after allowing the undissolved sulphate to subside, decanting off the clear solution for use.

Use. This solution gives rise to a precipitate (oxalate of calcium) when treated with oxalic acid or a soluble oxalate; it is used under Acidum Tartaricum to ascertain the absence of oxalic acid.

SOLUTION OF SULPHYDRATE OF AMMONIUM.

Prep. By passing a stream of sulphuretted hydrogen gas into three fluid ounces of solution of ammonia as long as the gas continues to be absorbed. Two ounces of solution of ammonia are then added, and the liquid kept in a green glass stoppered bottle.

Use. The solution of sulphydrate of ammonium ($\mathbf{NH_4HS}$) is used to precipitate various metals from solution. It is employed to determine the presence of zinc in the salts of that metal; it gives with them a white precipitate of sulphide of zinc, which is very characteristic. Sulphydrate of ammonium gives rise to no precipitate in neutral solutions containing arsenious and arsenic acid, but an orange-red precipitate with neutral solutions of antimony, soluble in excess of the reagent.

Salts of mercury, silver, lead, copper, bismuth, tin, gold, and platinum, are precipitated as brown or black sulphides by the solution of sulphydrate of ammonium. The precipitates formed with the protoxide of tin, and the peroxides of gold and platinum, are soluble in excess of the reagent; the sulphide of tin requires a large excess.

SOLUTION OF TARTARIC ACID.

Prep. Made by dissolving an ounce of crystallised tartaric acid in eight fluid ounces of distilled water, and adding to it two fluid ounces of rectified spirit.

The spirit is employed on account of the liability of the watery solution of tartaric acid to become opaque from the formation of a vegetable growth.

Use. The solution of tartaric acid is used in the Pharmacopœia for the purpose of ascertaining the presence of potassium; for if added in excess to any solution containing that base, a very insoluble salt, the acid or bitartrate of potassium, is thrown down. Again, tartaric acid prevents the precipitation of oxide of antimony when an acid solution of this metal is added to water.

It is employed under Potassii Acetas; also under Liquor Antimonii Chloridi, and Antimonium Tartaratum.

SOLUTION OF YELLOW CHROMATE OF POTASSIUM.

Prep. By dissolving two hundred and ninety-five grains of red chromate of potassium (bichromate of potassium) in ten fluid ounces of distilled water, and exactly neutralising the solution with bicarbonate of potassium, evolution of all carbonic acid being ensured by ebullition. The solution is finally filtered. Employed in testing bromide of ammonium: five grains of the salt dissolved in an ounce of distilled water to which two drops of this solution have been added, require not more than 514·5 and not less than 508·5 grain-measures of the volumetric solution of nitrate of silver to produce a permanent red precipitate. Solution of yellow chromate of potassium only gives a red colour with nitrate of silver when any soluble bromide or iodide present is completely decomposed. (See *Indicators of the Termination of Reactions in Volumetric Operations.*)

TINCTURE OF PHENOL-PHTHALEIN.

Prep. By dissolving one grain of phenol-phthalein in five hundred grains of proof spirit. The solution should be colourless. (See *Indicators of the Termination of Reactions in Volumetric Operations.*)

In addition to these solutions, the volumetric solutions of *nitrate of silver* and of *iodine* are also made use of as test-solutions for qualitative analysis. *Nitrate of silver* is used as a test for hydrochloric acid and the chlorides, with which it forms a curdy white precipitate (chloride of silver), soluble in excess of ammonia, but insoluble in nitric acid;—for hydrocyanic acid and the cyanides, with which it forms a white cyanide of silver, entirely soluble in boiling nitric acid;—for tribasic phosphoric acid, with which it gives a yellow phosphate of silver, soluble in excess both of nitric acid and ammonia;—for arsenic acid, with which it gives a brick-red precipitate of arseniate of silver, soluble in excess of nitric acid and ammonia. It is also used as a test for the purity of rectified spirit. The *solution of iodine* is used as a test for starch in various substances, as in calumba, gamboge, catechu, scammony, flour of mustard, &c.

LEEDS SCHOOL OF MEDICINE

IV.

VOLUMETRIC SOLUTIONS.

The processes for volumetric estimations may be performed either with British or with metric weights and measures, and the solutions are so arranged that they will be of the same strength, and the same indications will be obtained in using them, whichever system is employed, without the *necessity* of altering any of the figures by which the quantities of the substances tested or of the test solutions required in the process, are expressed.

According to the British system, the quantities of the substances to be tested are expressed in grains by weight, as also are the ingredients of which the test solutions are formed, whilst the quantities of the test solutions employed in testing are expressed in grain-measures,—the grain-measure being the volume of a grain of distilled water.

According to the metric system, the quantities of the substances to be tested are expressed in grammes by weight, whilst the quantities of the test solutions employed in testing are expressed in cubic centimetres (C.C.)—the cubic centimetre being the volume of a gramme of distilled water.

As the cubic centimetre bears the same relation to the gramme that the grain-measure bears to the grain, the one system may be substituted for the other with no difference in the results, excepting that, by the metric system, all the quantities will be expressed in relation to a weight (the gramme) which is rather more than fifteen (15·431) times as great as the British grain.

In practice it will be found convenient in substituting metrical for British weights and measures, to reduce the values of all the numbers to one-tenth, by moving the decimal points. The quantities indicated in the Pharmacopœia, which in grains and grain-measures can be conveniently used, would be found inconveniently large if the same numbers of grammes and cubic centimetres were employed.

The following apparatus is required in the preparation and use of these solutions.

For British weights and measures :—

1. A flask, which, when filled to a mark on the neck, contains exactly 10,000 grains of distilled water at 60° F. (15°·5 C.). The capacity of the flask is therefore 10,000 grain-measures.

2. A graduated cylindrical jar, which when filled to 0, holds 10,000 grains of distilled water, and is divided into 100 equal parts.

3. A burette. A graduated glass tube, which when filled to 0, holds 1000 grains of distilled water, and is divided into 100 equal parts. Each part therefore corresponds to ten grain-measures.

For metric weights and measures :—

1. A glass flask, which, when filled to a mark on the neck, contains one litre, or 1000 cubic centimetres.

2. A graduated cylindrical jar, which, when filled to 0, contains one litre, and is divided into 100 equal parts.

3. A burette. A graduated tube, which, when filled to 0, holds 100 cubic centimetres, and is divided into 100 equal parts.

(One cubic centimetre is the volume of one gramme of distilled water at 4° C.* (39°·2 F.). 1000 cubic centimetres equal one litre.)

Volumetric solutions, before being used, should be shaken, in order that they may be throughout of uniform strength. They should also be preserved in stoppered bottles. All measures should be made at 60° F. (15°·5 C.).

The following are the directions given in the Pharmacopœia for the preparation of the volumetric solutions.

VOLUMETRIC SOLUTION OF BICHROMATE OF POTASSIUM.

(Bichromate of Potassium $K_2Cr_2O_7$, = 295.)

Take of

Bichromate of potassium . . .	147·5 grains ;
Distilled water	a sufficiency.

Put the bichromate of potassium into the 10,000 grain flask, and, having half filled the flask with water, allow the salt to dissolve; then dilute the solution with more water, until it has the exact bulk of 10,000 grain-measures. One thousand grain-measures of this solution contain 14·75 grains of the bichromate ($\frac{1}{20}$th of $K_2Cr_2O_7$, in grains), and when added to a solution of a ferrous salt acidulated with hydrochloric acid, are capable of converting 16·8 grains of iron ($\frac{1}{20}$th of $6Fe$, in grains) from the ferrous to the ferric state.

---

* It is customary to make the measurements with metric apparatus at 60° F. (15°·5 C.)

Grammes and cubic centimetres may be employed instead of grains and grain-measures, but for convenience $\frac{1}{10}$th of the numbers should be taken. Thus 14·75 grammes of bichromate of potassium should be made to form 1,000 cubic centimetres of solution. One hundred cubic centimetres of this solution contain 1·475 grammes of the bichromate ($\frac{1}{200}$th of $K_2Cr_2O_7$, in grammes), and when added to a solution of a ferrous salt acidulated with hydrochloric acid, are capable of converting 1·68 gramme of iron ($\frac{1}{200}$th of $6Fe$, in grammes) from the ferrous to the ferric state.

This solution is used to determine the proportion of ferrous salt in the following preparations: Ferri Arsenias, Ferri Carbonas Saccharata, Ferri Phosphas, Ferri Sulphas, Ferri Sulphas Exsiccata, Ferri Sulphas Granulata. When the bichromate is added to a solution of a ferrous salt in hydrochloric acid, it is converted from the ferrous to the ferric state, and by ascertaining the amount of the solution necessary to complete this change, the quantity of ferrous salt present can be estimated. The nature of the decompositions which occur may be represented by the following formula, $K_2Cr_2O_7 + 6FeO + 8HCl = 3(Fe_2O_3) + Cr_2Cl_6 + 2KCl + 4H_2O$. Two equivalents of chromic acid ($2CrO_3$) present in the bichromate, yield three equivalents of oxygen, which convert six equivalents of ferrous oxide, $6(FeO)$, into three of ferric oxide, $3(Fe_2O_3)$. Consequently 147·5, the equivalent in grains of bichromate of potassium, is capable of converting, and will therefore represent, six equivalents in grains of ferrous oxide; and one thousand grain-measures of the volumetric solution, containing 14·75 grains of the bichromate, will represent 16·8 or $\frac{1}{20}$th of six equivalents of iron (Fe). When all the iron is converted into a ferric salt, a drop of the solution will no longer strike a blue colour with ferricyanide of potassium.

VOLUMETRIC SOLUTION OF HYPOSULPHITE OF SODIUM.

(Hyposulphite of Sodium crystallised, $\mathbf{Na_2S_2O_3,5H_2O}=248$.)

(Take of hyposulphite of sodium, in crystals, two hundred and eighty grains; distilled water, a sufficiency.) Dissolve the hyposulphite of sodium in 10,000 grain-measures of water. Fill a burette with this solution and drop it cautiously into 1000 grain-measures of the volumetric solution of iodine, until the brown colour is just discharged. Note the number of grain-measures (*n*) required to produce this effect; then put 8000 grain-measures of the same solution into a graduated jar, and augment this quantity by the addition of distilled water until it amounts to $\frac{8000\times 1000}{n}$ grain-measures. If, for example, $(n)=950$, the 8000 grain-measures of solution should be diluted to the bulk of $\frac{8000\times 1000}{950}$ $=8421$ grain-measures. 1000 grain measures of this solution contain 24·8 grains of the hyposulphite ($\frac{1}{10}$th of $\mathbf{Na_2S_2O_3,5H_2O}$, in grains), and therefore correspond to 12·7 grains of iodine ($\frac{1}{10}$th of an atomic weight in grains).

Grammes and cubic centimetres may be employed instead of grains and grain-measures, but for convenience $\frac{1}{10}$ of the numbers should be taken. 100 cubic centimetres of this solution contain 2·48 grammes of hyposulphite ($\frac{1}{100}$th of $\mathbf{Na_2S_2O_3,5H_2O}$, in grammes), and therefore correspond to 1·27 grammes of iodine ($\frac{1}{100}$th of an atomic weight in grammes).

This solution is employed for testing the following substances: Iodum, Calx Chlorinata, Liquor Calcis Chlorinatæ, Liquor Chlori, Liquor Sodæ Chlorinatæ. In each case, except that of Iodum, a solution of iodide of potassium and hydrochloric acid are added to the substance, and the amount of iodine so liberated is indicated by the volumetric solution. When this solution is added to a liquid containing free iodine, a decomposition takes place, which may be represented by the formula $\mathbf{2Na_2S_2O_3,5H_2O+I_2=Na_2S_4O_6+2NaI+10H_2O}$, iodide of sodium and tetrathionate of sodium being formed, the solutions of which are devoid of colour. Hence, to decolorise one equivalent in grains of iodine, one equivalent in grains of the hyposulphite is required. Now 1000 grain-measures of the volumetric solution contain 24·8 or $\frac{1}{10}$ of an equivalent in grains of the hyposulphite of sodium, and will therefore represent 12·7 or $\frac{1}{10}$ of one equivalent in grains of iodine.

VOLUMETRIC SOLUTION OF IODINE.

(Iodine, I = 127.)

(Take of iodine, 127 grains; iodide of potassium, 180 grains; distilled water, a sufficiency.) Put the iodine and the iodide of potassium into the 10,000 grain flask, fill the flask to about two-thirds its bulk with distilled water, gently agitate until solution is complete, and then dilute the solution with more water until it has the exact volume of 10,000 grain-measures. 1000 grain-measures of this solution contain $\frac{1}{10}$ of an atomic weight in grains (12·7 grains) of iodine, and therefore correspond to 1·7 grains of sulphuretted hydrogen, 3·2 grains of sulphurous anhydride, and 4·95 grains of arsenious anhydride.

Grammes and cubic centimetres may be employed instead of grains and grain-measures, but for convenience $\frac{1}{10}$ of the numbers should be taken. 100 cubic centimetres contain 1·27 grammes of iodine, and correspond to 0·17 gramme of sulphuretted hydrogen, 0·32 gramme of sulphurous anhydride and 0·495 grammes of arsenious anhydride. It is dropped into the solution to be tested until free iodine begins to appear, and the number of measures added before this colour appears is carefully noted.

This solution is principally used for the quantitative estimation of sulphurous anhydride and arsenious anhydride, all the sulphurous anhydride being converted into sulphuric acid and the arsenious into arsenic acid, before any free iodine appears. The following equation represents the decompositions which occur: $H_2SO_3 + I_2 + H_2O = H_2SO_4 + 2HI$; so that two equivalents of iodine are required to each equivalent of sulphurous anhydride before any free iodine appears, and two equivalents of iodine will correspond to one equivalent of the sulphurous anhydride, or 1000 grain-measures containing 12·7 grains of iodine will represent 3·2 grains of sulphurous anhydride. For the conversion of arsenious anhydride into arsenic, four equivalents of iodine will be required ($As_2O_3 + 2H_2O + 2I_2 = As_2O_5 + 4HI$). So that 1000 grain-measures of the volumetric solution will represent 4·95 grains of arsenious anhydride.

It is employed for testing the following substances:—Acid. Arseniosum, Acid. Sulphurosum, Liquor Arsenicalis, Liquor Arsenici Hydrochloricus, Sodii Hyposulphis.

It is also used for the estimation of sulphuretted hydrogen, 1000 grain-measures of the solution representing 1·7 grains of sulphuretted hydrogen.

VOLUMETRIC SOLUTION OF NITRATE OF SILVER.

(Nitrate of Silver, $AgNO_3 = 170$.)

(Take of nitrate of silver, 170 grains; distilled water, a sufficiency.) Put the nitrate of silver into the 10,000 grain flask, and, having half filled the flask with water, allow the salt to dissolve; then dilute the solution with more water until it has the exact bulk of 10,000 grain-measures. The solution should be kept in an opaque stoppered bottle. 1000 grain-measures of this solution contain $\frac{1}{10}$ of molecular weight in grains of nitrate of silver (or 17 grains).

Grammes and cubic centimetres may be employed instead of grains and grain-measures, but for convenience $\frac{1}{10}$ of the numbers should be taken. 100 cubic centimetres contain $\frac{1}{100}$ of a molecular weight in grammes of nitrate of silver (or 1·7 grammes).

This solution is used in testing the following substances: Acidum Hydrocyanicum Dilutum, Ammonii Bromidum, Potassii Bromidum, Potassii Cyanidum, Potassii Iodidum, Sodii Bromidum, Sodii Iodidum. When nitrate of silver is added to a solution of hydrocyanic acid, to which an excess of soda has been added, it gives rise to the formation of a double salt, consisting of one equivalent of cyanide of sodium and one equivalent of cyanide of silver ($NaAgCy_2$) which is precipitated at first, but re-dissolved on agitation. When all the hydrocyanic acid is withdrawn in the formation of this double cyanide, nitrate of silver gives rise to a precipitate no longer soluble; the appearance of this permanent precipitate of oxide of silver is an indication that all the cyanogen is exhausted. The changes may be exhibited in the formula ($AgNO_3 + 2NaCy = NaNO_3 + NaAgCy_2$), and when no more cyanide is present ($2AgNO_3 + 2NaHO = 2NaNO_3 + Ag_2O + H_2O$). Hence it will be seen that each equivalent of nitrate of silver represents two of hydrocyanic acid. So that 17 grains of nitrate of silver will correspond to 5·4 (2·7×2) grains of absolute hydrocyanic acid.

VOLUMETRIC SOLUTION OF OXALIC ACID.

(Oxalic acid crystallised, $\mathbf{H_2C_2O_4, 2H_2O} = 126$.)

Take of

Oxalic acid in crystals	660 grains;
Distilled water	a sufficiency.

Put the oxalic acid into the 10,000 grain flask, fill the flask to about two-thirds of its bulk with water, allow the acid to dissolve, and then dilute the solution with more water until it has the exact volume of 10,000 grain-measures. Fill a burette with the fluid, and add it gradually to a solution of 10·6 grains of pure carbonate of sodium (which may be obtained by heating the ordinary pure bicarbonate of sodium to redness in a platinum crucible for a quarter of an hour), containing a few drops of solution of litmus, until the red colour produced ceases to change to blue on boiling. Note the number of grain-measures used (n), then put 9000 grain-measures of the solution of oxalic acid into a graduated jar, and augment this quantity by the addition of distilled water until it amounts to $\frac{9000 \times 200}{n}$ grain-measures. One thousand grain-measures of this solution contain half a molecular weight in grains (sixty-three grains) of oxalic acid, and are therefore capable of neutralising one molecular weight in grains of such alkalies as potash, $\mathbf{KHO}$, or soda, $\mathbf{NaHO}$; or half the molecular weight in grains of such salts as anhydrous carbonate of sodium, $\mathbf{Na_2CO_3}$, crystallised carbonate of sodium ($\mathbf{Na_2CO_3}$ $\mathbf{10H_2O}$), &c.

Grammes and cubic centimetres may be employed instead of grains and grain-measures, but for convenience $\frac{1}{10}$th of the numbers should be taken. One hundred cubic centimetres contain $\frac{1}{0}$th of a molecular weight in grammes (6·3 grammes) of oxalic acid, and will neutralise $\frac{1}{10}$th of a molecular weight in grammes of an alkali.

This solution is employed in testing the following substances: Ammonii Carbonas, Borax, Liquor Ammoniæ, Liquor Ammoniæ Fortior, Liquor Calcis, Liquor Calcis Sacch., Liquor Plumbi Subacetatis, Liquor Potassæ, Liquor Potassæ Efferv., Liquor Sodæ, Liquor Sodæ Efferv., Plumbi Acetas, Potassa Caustica, Potassii Bicarbonas, Potassii Carbonas, Potassii Citras, Potassii Tartras, Potassii Tartras Acida, Soda Caustica, Soda Tartarata, Sodii Carbonas, Sodii Bicarbonas, and Sodium.

VOLUMETRIC SOLUTION OF SODA.

(Hydrate of Sodium, **NaHO** = 40.)

(Take of solution of soda, a sufficiency; distilled water, a sufficiency.) Fill a burette with the solution of soda, and drop this into 1000 grain-measures of the volumetric solution of oxalic acid, until the acid is exactly neutralised, as indicated by litmus. Note the number of grain-measures (n) of the solution of soda used, and having then introduced 9000 grain-measures of it into a graduated jar, augment this quantity by the addition of water, until it becomes $\frac{9000 \times 1000}{n}$ grain-measures. If, for example, $n =$ 930, the 9000 grain-measures should be augmented to $\frac{9000 \times 1000}{930}$ = 9677 grain-measures.

1000 grain-measures of this solution contain one molecular weight in grains (40 grains) of hydrate of sodium, and will therefore neutralise one molecular weight in grains of any monobasic acid, or half the molecular weight in grains of any dibasic acid, &c.

Grammes and cubic centimetres may be employed instead of grains and grain-measures, but for convenience $\frac{1}{10}$th of the numbers should be taken. One hundred cubic centimetres contain $\frac{1}{10}$th of a molecular weight in grammes of hydrate of sodium (four grammes) and will neutralise $\frac{1}{10}$th of a molecular weight in grammes of a monobasic acid. This solution is employed in testing vinegar, and the following acids:—acetic, dilute acetic, glacial acetic, citric, dilute hydrobromic, hydrochloric, dilute hydrochloric, lactic, dilute lactic, nitric, dilute nitric, dilute nitro-hydrochloric, sulphuric, aromatic sulphuric, dilute sulphuric, and tartaric.

INDICATORS OF THE TERMINATION OF REACTIONS IN VOLUMETRIC OPERATIONS.

Mucilage of Starch.

It gives an intense blue colour with iodine. It may be used with the following substances:—Acidum Arseniosum, Acidum Sulphurosum, Calx Chlorinata, Iodum, Liquor Arsenicalis, Liquor Arsenici Hydrochloricus, Liquor Calcis Chlorinatæ, Liquor Sodæ Chlorinatæ, Liquor Chlori, Sodii Hyposulphis.

Solution of Ferricyanide of Potassium.

It gives an intensely blue precipitate with ferrous salts, but none with ferric salts. It is used with the following substances:—Ferri Arsenias, Ferri Carbonas Saccharata, Ferri Phosphas, Ferri Sulphas, Ferri Sulphas Exsiccata, Ferri Sulphas Granulata.

Solution of Litmus.

It gives a red colour with acids, and a blue colour with alkalies. It may be used with the following substances:—Acidum Hydrochloricum, Acidum Hydrochloricum Dilutum, Acidum Nitricum, Acidum Nitricum Dilutum, Acidum Nitro-hydrochloricum Dilutum, Acidum Sulphuricum, Acidum Sulphuricum Aromaticum, Acidum Sulphuricum Dilutum, Ammonii Carbonas, Borax, Liquor Ammoniæ, Liquor Ammoniæ Fortior, Liquor Calcis, Liquor Calcis Saccharatus, Liquor Potassæ, Liquor Potassæ Effervescens, Liquor Sodæ, Liquor Sodæ Effervescens, Potassa Caustica, Potassii Bicarbonas, Potassii Carbonas, Potassii Citras, Potassii Tartras, Potassii Tartras Acida, Soda Caustica, Soda Tartarata, Sodii Bicarbonas, Sodii Carbonas.

Solution of Yellow Chromate of Potassium.

It gives a red colour with nitrate of silver, but not until any soluble bromide or iodide present is entirely decomposed. It may be used with the following substances:—Ammonii Bromidum, Potassii Bromidum, Potassii Iodidum, Sodii Bromidum, Sodii Iodidum.

Tincture of Phenol-Phthalein.

It gives an intense red with potash or soda. It may be used with the following substances:—Acetum, Acidum Aceticum, Acidum Aceticum Dilutum, Acidum Aceticum Glaciale, Acidum Citricum, Acidum Tartaricum.

V.

POSOLOGICAL TABLE.

The following List exhibits the doses of important remedial agents and their preparations as ordinarily prescribed for adults. When medicines are administered to young children or very aged persons some modification is required; and the annexed Table, by Gaubius, will serve somewhat as a guide for the regulation of the doses for patients of different ages:—

AGES.	PROPORTIONAL QUANTITIES.	DOSES.
For an adult	*suppose the dose to be* *One*	*or* 60 *grains.*
Under 1 year	will require only . . . . . $\frac{1}{12}$	5 grains.
,, 2 years	,, ,, ... $\frac{1}{8}$	7½ grains.
,, 3 ,,	,, ,, ... $\frac{1}{6}$	10 grains.
,, 4 ,,	,, ,, ... $\frac{1}{4}$	15 grains.
,, 7 ,,	,, ,, ... $\frac{1}{3}$	20 grains.
,, 14 ,,	,, ,, ... $\frac{1}{2}$	30 grains.
,, 20 ,,	,, ,, ... $\frac{2}{3}$	40 grains.
Above 21 ,,	the full dose . . . . . . —	60 grains.
,, 65 ,,	the inverse gradation of the above.	

It should be borne in mind, that certain drugs, especially *opium*, must be administered with great care to children, and that *mercurials* can be taken for a long time by such subjects without the ordinary symptoms of mercurialisation being produced. Besides age, other circumstances, such as sex, temperament, climate, and custom, have great influence on the action of medicines.

Acetum	1 fl. drm. to 1 fl. oz., diluted.
Acetum Scillæ	15 min. to 40 min.

Acidum Aceticum Dilutum	1 fl. drm. to 1 fl. oz., freely diluted.
Acidum Arseniosum	$\frac{1}{60}$ gr. to $\frac{1}{12}$ gr.
Acidum Benzoicum	10 gr. to 15 gr.
Acidum Boricum	5 gr. to 30 gr.
Acidum Carbolicum	1 gr. to 3 gr.
Acidum Carbolicum Liquefactum	1 min. to 4 min.
Acidum Citricum	10 gr. to 30 gr.
Acidum Gallicum	2 gr. to 10 gr.
Acidum Hydrobromicum Dilutum	15 min. to 50 min.
Acidum Hydrochloricum Dilutum	10 min. to 30 min., freely diluted.
Acidum Hydrocyanicum Dilutum	2 min. to 8 min.
Acidum Lacticum Dilutum	$\frac{1}{2}$ fl. drm. to 2 fl. drm.
Acidum Nitricum Dilutum	10 min. to 30 min., freely diluted.
Acidum Nitro-Hydrochloricum Dilutum	5 min. to 20 min., freely diluted.
Acidum Phosphoricum Concentratum	2 min. to 5 min., freely diluted.
Acidum Phosphoricum Dilutum	10 min. to 30 min.
Acidum Sulphuricum Aromaticum	5 min. to 30 min.
Acidum Sulphuricum Dilutum	5 min. to 30 min.
Acidum Sulphurosum	$\frac{1}{2}$ fl. drm. to 1 fl. drm.
Acidum Tannicum	2 gr. to 10 gr.
Acidum Tartaricum	10 gr. to 30 gr.
Æther	20 min. to 60 min.
Æther Aceticus	20 min. to 60 min.
Aloe Barbadensis (in powder)	2 gr. to 6 gr.
Aloe Socotrina (in powder)	2 gr. to 6 gr.
Aloin	$\frac{1}{2}$ gr. to 2 gr.
Alumen (as an astringent)	10 gr. to 20 gr.
Alumen (as a purgative)	30 gr. to 60 gr.
Ammoniacum (the gum resin)	10 gr. to 20 gr.
Ammonii Benzoas	10 gr. to 20 gr.
Ammonii Bromidum	2 gr. to 20 gr.
Ammonii Carbonas (as a stimulant)	3 gr. to 10 gr.
Ammonii Carbonas (as an emetic)	30 gr., freely diluted.
Ammonii Chloridum (as an alterative)	5 gr. to 10 gr.

Ammonii Chloridum (as an anti-periodic)	20 gr. to 30 gr.
Ammonii Phosphas	5 gr. to 20 gr.
Amyl Nitris (by inhalation)	2 min. to 5 min.
Amyl Nitris (in mixtures)	$\frac{1}{2}$ min. to 1 min.
Antimonii Oxidum	1 gr. to 4 gr.
Antimonium Sulphuratum	1 gr. to 5 gr.
Antimonium Tartaratum (as a diaphoretic expectorant)	$\frac{1}{16}$ gr. to $\frac{1}{6}$ gr.
Antimonium Tartaratum (as a vascular depressant or sedative)	$\frac{1}{6}$ gr. to 2 gr.
Antimonium Tartaratum (as an emetic)	1 gr. to 2 gr.
Aquæ. The dose of those omitted is from	1 fl. oz. to 2 fl. oz.
Aqua Chloroformi	$\frac{1}{2}$ fl. oz. to 2 fl. oz.
Aqua Laurocerasi	$\frac{1}{2}$ fl. drm. to 2 fl. drm.
Argenti Nitras	$\frac{1}{6}$ gr. to $\frac{1}{3}$ gr.
Argenti Oxidum	$\frac{1}{2}$ gr. to 2 gr.
Arsenii Iodidum	$\frac{1}{30}$ gr.
Asafœtida (the gum resin)	5 gr. to 20 gr.
Balsamum Peruvianum	10 min. to 15 min.
Balsamum Tolutanum	10 gr. to 20 gr.
Beberinæ Sulphas	1 gr. to 10 gr.
Benzoinum (the balsamic resin)	10 gr. to 30 gr.
Bismuthi Carbonas	5 gr. to 20 gr.
Bismuthi Citras	2 gr. to 5 gr.
Bismuthi et Ammonii Citras	2 gr. to 5 gr.
Bismuthi Oxidum	5 gr. to 15 gr.
Bismuthi Subnitras	5 gr. to 20 gr.
Borax	5 gr. to 40 gr.
Butyl-Chloral Hydras	5 gr. to 15 gr.
Caffeina	1 gr. to 5 gr.
Caffeina Citras	2 gr. to 10 gr.
Calcii Carbonas Præcipitata	10 gr. to 60 gr.
Calcii Chloridum	3 gr. to 10 gr.
Calcii Hypophosphis	5 gr. to 10 gr.
Calcii Phosphas	10 gr. to 20 gr.
Calumba (in powder)	5 gr. to 20 gr.
Calx Sulphurata	$\frac{1}{10}$ gr. to 1 gr.
Cambogia (the powdered resin)	1 gr. to 4 gr.
Camphora	1 gr. to 10 gr.
Canella (in powder)	15 gr. to 30 gr.

Capsicum (in powder)	½ gr. to 1 gr.
Carbo Animalis Purificatus	1 drm. to ½ oz.
Carbo Animalis Purificatus (as an antidote)	½ oz. to 2 oz., and upwards.
Carbo Ligni	1 drm. to ½ oz.
Cardamomum (powdered Cardamoms)	5 gr. to 20 gr.
Caryophyllum (cloves in powder)	5 gr. to 20 gr.
Cascarilla (powdered bark)	10 gr. to 30 gr.
Cassia (the prepared pulp)	120 gr. and upwards.
Catechu (in powder)	10 gr. to 30 gr.
Cerevisiæ Fermentum	½ oz. to 1 oz.
Cerii Oxalas	1 gr. to 2 gr.
Chloral Hydras	5 gr. to 30 gr.
Chloroformum	3 min. to 10 min.
Chrysarobinum	⅙ gr. to ½ gr.
Cinchona (the powdered bark)	10 gr. to 60 gr.
Cinchonidinæ Sulphas	1 gr. to 10 gr.
Cinchoninæ Hydrochloras	1 gr. to 10 gr.
Cinchoninæ Sulphas	1 gr. to 10 gr.
Cinnamomum (powdered bark)	10 gr. to 30 gr.
Coca (leaves)	½ drm. to 2 drm.
Cocainæ Hydrochloras	⅕ gr. to 1 gr.
Codeina	¼ gr. to 2 gr.
Colchicum (the powdered corm)	2 gr. to 8 gr.
Colocynth (the powdered pulp)	2 gr. to 8 gr.
Confectio Opii	5 gr. to 20 gr.
Confectio Piperis	60 gr. to 120 gr.
Confectio Rosæ Caninæ	60 gr. or more.
Confectio Rosæ Gallicæ	60 gr. or more.
Confectio Scammonii	10 gr. to 30 gr., or more.
Confectio Sennæ	60 gr. to 120 gr.
Confectio Sulphuris	60 gr. to 120 gr.
Confectio Terebinthinæ	60 gr. to 120 gr.
Conii Folia	2 gr. to 8 gr.
Copaiba	½ fl. drm. to 1 fl. drm.
Coriandrum (the powdered fruit)	10 gr. to 30 gr., or more.
Creasotum	1 min. to 3 min.
Creta Præparata	10 gr. to 60 gr.
Crocus (dried)	20 gr. and upwards.
Cubeba (the powder)	30 gr. to 120 gr.
Cupri Sulphas (as an astringent or tonic)	¼ gr. to 2 gr.

Cupri Sulphas (as an emetic)	5 gr. to 10 gr.
Cusso	$\frac{1}{4}$ oz. to $\frac{1}{2}$ oz.
Decocta. Those not enumerated may be given in doses from	1 fl. oz. to 2 fl. oz.
Decoctum Aloes Compositum	$\frac{1}{2}$ fl. oz. to 2 fl. oz.
Decoctum Cetrariæ	1 fl. oz. to 4 fl. oz.
Decoctum Granati Radicis	2 fl. oz. to 4 fl. oz.
Decoctum Hordei	1 fl. oz. to 4 fl. oz.
Decoctum Sarsæ	2 fl. oz. to 10 fl. oz.
Decoctum Sarsæ Compositum	2 fl. oz. to 10 fl. oz.
Decoctum Scoparii	2 fl. oz. to 4 fl. oz.
Decoctum Taraxaci	2 fl. oz. to 4 fl. oz.
Digitalis Folia	$\frac{1}{2}$ gr. to $1\frac{1}{2}$ gr.
Elaterinum	$\frac{1}{40}$ gr. to $\frac{1}{10}$ gr.
Elaterium	$\frac{1}{16}$ gr. to $\frac{1}{2}$ gr.
Ergota (the powdered ergot)	20 gr. to 30 gr.
Ergotinum	2 gr. to 5 gr.
Essentia Anisi	10 min. to 20 min.
Essentia Menthæ Piperitæ	10 min. to 20 min.
Extractum Aconiti	$\frac{1}{4}$ gr. to 1 gr.
Extractum Aloes Barbadensis	2 gr. to 6 gr.
Extractum Aloes Socotrinæ	2 gr. to 6 gr.
Extractum Anthemidis	2 gr. to 10 gr.
Extractum Belæ Liquidum	1 fl. drm. to 2 fl. drm.
Extractum Belladonnæ	$\frac{1}{4}$ gr. to 1 gr.
Extractum Belladonnæ Alcoholicum	$\frac{1}{16}$ gr. to $\frac{1}{4}$ gr.
Extractum Calumbæ	2 gr. to 10 gr.
Extractum Cannabis Indicæ	$\frac{1}{4}$ gr. to 1 gr.
Extractum Cascaræ Sagradæ	2 gr. to 8 gr.
Extractum Cascaræ Sagradæ Liquidum	$\frac{1}{2}$ fl. drm. to 2 fl. drm.
Extractum Cimicifugæ Liquidum	3 min. to 30 min.
Extractum Cinchonæ Liquidum	5 min. to 10 min.
Extractum Cocæ Liquidum	$\frac{1}{2}$ fl. drm. to 2 fl. drm.
Extractum Colchici	$\frac{1}{2}$ gr. to 2 gr.
Extractum Colchici Aceticum	$\frac{1}{2}$ gr. to 2 gr.
Extractum Colocynthidis Compositum	3 gr. to 10 gr.
Extractum Conii	2 gr. to 6 gr.
Extractum Ergotæ Liquidum	10 min. to 30 min.
Extractum Filicis Liquidum	15 min. to 30 min.
Extractum Gelsemii Alcoholicum	$\frac{1}{2}$ gr. to 2 gr.
Extractum Gentianæ	2 gr. to 10 gr.

Extractum Glycyrrhizæ	5 gr. to 1 drm.
Extractum Glycyrrhizæ Liquidum	1 fl. drm.
Extractum Hæmatoxyli	10 gr. to 30 gr.
Extractum Hyoscyami	5 gr. to 10 gr.
Extractum Jaborandi	2 gr. to 10 gr.
Extractum Jalapæ	5 gr. to 15 gr.
Extractum Krameriæ	5 gr. to 20 gr.
Extractum Lactucæ	5 gr. to 15 gr.
Extractum Lupuli	5 gr. to 15 gr.
Extractum Nucis Vomicæ	$\frac{1}{4}$ gr. to 1 gr.
Extractum Opii	$\frac{1}{2}$ gr. to 2 gr.
Extractum Opii Liquidum	10 min. to 40 min.
Extractum Papaveris	2 gr. to 5 gr.
Extractum Pareiræ	10 gr. to 30 gr.
Extractum Pareiræ Liquidum	$\frac{1}{2}$ fl. drm. to 2 fl. drm.
Extractum Physostigmatis	$\frac{1}{16}$ gr. to $\frac{1}{4}$ gr.
Extractum Quassiæ	3 gr. to 5 gr.
Extractum Rhamni Frangulæ	15 gr. to 60 gr.
Extractum Rhamni Frangulæ Liquidum	1 fl. drm. to 4 fl. drm.
Extractum Rhei	5 gr. to 15 gr.
Extractum Sarsæ Liquidum	2 fl. drm. to 4 fl. drm.
Extractum Stramonii	$\frac{1}{4}$ gr. to $\frac{1}{2}$ gr.
Extractum Taraxaci	5 gr. to 30 gr.
Extractum Taraxaci Liquidum	$\frac{1}{4}$ fl. drm. to 2 fl. drm.
Fel Bovinum Purificatum	5 gr. to 10 gr.
Ferri Arsenias	$\frac{1}{16}$ gr. to $\frac{1}{2}$ gr.
Ferri Carbonas Saccharata	5 gr. to 30 gr.
Ferri et Ammonii Citras	5 gr. to 10 gr.
Ferri et Quininæ Citras	5 gr. to 10 gr.
Ferri Peroxidum Hydratum	5 gr. to 30 gr.
Ferri Phosphas	5 gr. to 10 gr.
Ferri Sulphas	1 gr. to 5 gr.
Ferri Sulphas Exsiccata	$\frac{1}{2}$ gr. to 3 gr.
Ferri Sulphas Granulata	1 gr. to 5 gr.
Ferrum Redactum	1 gr. to 5 gr.
Ferrum Tartaratum	5 gr. to 10 gr.
Filix Mas (of the powdered root)	60 gr. to 120 gr.
Galbanum (the gum resin)	10 gr. to 30 gr.
Gelsemium	5 gr. to 30 gr.
Gentianæ Radix (in powder)	10 gr. to 30 gr.
Glycerinum	1 fl. drm. to 2 fl. drm.
Guaiaci Resina	10 gr. to 30 gr.

Hydrargyri Sulphuretum (for fumigation)	30 gr. and upwards.
Hydrargyri Iodidum Rubrum	$\frac{1}{32}$ gr. to $\frac{1}{8}$ gr.
Hydrargyri Perchloridum	$\frac{1}{16}$ gr. to $\frac{1}{8}$ gr.
Hydrargyri Subchloridum	$\frac{1}{2}$ gr. to 5 gr.
Hydrargyrum cum Cretâ	3 gr. to 8 gr.
Infusa. Those not enumerated may be given in doses from	1 fl. oz. to 2 fl. oz.
Infusum Anthemidis	1 fl. oz. to 4 fl. oz.
Infusum Buchu	1 fl. oz. to 4 fl. oz.
Infusum Caryophylli	1 fl. oz. to 4 fl. oz.
Infusum Cusso	4 fl. oz. to 8 fl. oz.
Infusum Digitalis	2 fl. drm. to 4 fl. drm.
Infusum Maticæ	1 fl. oz. to 4 fl. oz.
Injectio Apomorphinæ Hypodermica (by subcutaneous injection)	2 min. to 8 min.
Injectio Ergotini Hypodermica (by subcutaneous injection)	3 min. to 10 min.
Injectio Morphinæ Hypodermica (by subcutaneous injection)	1 min. to 5 min.
Iodoformum	$\frac{1}{2}$ gr. to 3 gr.
Ipecacuanha (in powder, as an emetic)	15 gr. to 30 gr.
Ipecacuanha (in powder, as an expectorant)	$\frac{1}{2}$ gr. to 2 gr.
Jaborandi (powder)	5 gr. to 60 gr.
Jalapa (powder)	10 gr. to 30 gr.
Jalapæ Resina	2 gr. to 5 gr.
Kamala	30 gr. to $\frac{1}{4}$ oz.
Kino (in powder)	10 gr. to 30 gr.
Krameriæ Radix (in powder)	20 gr. to 60 gr.
Liquor Ammoniæ	10 min. to 30 min.
Liquor Ammoniæ Fortior	3 min. to 10 min., freely diluted.
Liquor Ammonii Acetatis	2 fl. drm. to 6 fl. drm.
Liquor Ammonii Acetatis Fortior	25 min. to 75 min.
Liquor Ammonii Citratis	2 fl. drm. to 6 fl. drm.
Liquor Ammonii Citratis Fortior	$\frac{1}{2}$ fl. drm. to $1\frac{1}{2}$ fl. drm.
Liquor Arsenicalis	2 min. to 8 min.
Liquor Arsenici Hydrochloricus	2 min. to 8 min.
Liquor Arsenii et Hydrargyri Iodidi (Donovan's Solution)	10 min. to 30 min.
Liquor Atropinæ Sulphatis	1 min. to 4 min.

Liquor Bismuthi et Ammonii Citratis	½ fl. drm. to 1 fl. drm.
Liquor Calcii Chloridi	15 min. to 50 min.
Liquor Calcis	1 fl. oz. to 4 fl. oz.
Liquor Calcis Saccharatus	15 min. to 60 min.
Liquor Chlori	10 min. to 20 min.
Liquor Ferri Acetatis	5 min. to 30 min.
Liquor Ferri Acetatis Fortior	1 min. to 8 min.
Liquor Ferri Dialysatus	10 min. to 30 min.
Liquor Ferri Perchloridi	10 min. to 30 min.
Liquor Ferri Pernitratis	10 min. to 40 min.
Liquor Hydrargyri Perchloridi	½ fl. drm. to 2 fl. drm.
Liquor Lithiæ Effervescens	5 fl. oz. to 10 fl. oz.
Liquor Magnesii Carbonatis	1 fl. oz. to 2 fl. oz.
Liquor Magnesii Citratis	5 fl. oz. to 10 fl. oz.
Liquor Morphinæ Acetatis	10 min. to 60 min.
Liquor Morphinæ Bimeconatis	5 min. to 40 min.
Liquor Morphinæ Hydrochloratis	10 min. to 60 min.
Liquor Potassæ	15 min. to 60 min.
Liquor Potassæ Effervescens	5 fl. oz. to 10 fl. oz.
Liquor Potassii Permanganatis	2 fl. drm. to 4 fl. drm.
Liquor Sodæ	10 min. to 1 fl. drm., freely diluted.
Liquor Sodæ Chlorinatæ	10 min. to 20 min.
Liquor Sodæ Effervescens	5 fl. oz. to 10 fl. oz.
Liquor Sodii Arseniatis	5 min. to 10 min.
Liquor Strychninæ Hydrochloratis	5 min. to 10 min.
Lithii Carbonas	3 gr. to 6 gr.
Lithii Citras	5 gr. to 10 gr.
Lupulinum	2 gr. to 5 gr.
Magnesia Levis	10 gr. to 60 gr.
Magnesia Ponderosa	10 gr. to 60 gr.
Magnesii Carbonas Levis	10 gr. to 60 gr.
Magnesii Carbonas Ponderosa	10 gr. to 60 gr.
Magnesii Sulphas	60 gr. to ½ oz. or more.
Manna	60 gr. to 1 oz.
Mastiche (resin, in powder)	20 gr. to 40 gr.
Maticæ Folia (in powder)	30 gr. to 60 gr.
Menthol	½ gr. to 2 gr.
Misturæ. Those omitted may be given in doses from	1 fl. oz. to 2 fl. oz.
Mistura Ammoniaci	½ fl. oz. to 1 fl. oz.
Mistura Guaiaci	½ fl. oz. to 2 fl. oz.

Mistura Scammonii	1 fl. oz. to 3 fl. oz.
Mistura Sennæ Composita	1 fl. oz. to $1\frac{1}{2}$ fl. oz.
Morphinæ Acetas	$\frac{1}{8}$ gr. to $\frac{1}{2}$ gr.
Morphinæ Hydrochloras	$\frac{1}{8}$ gr. to $\frac{1}{2}$ gr.
Morphinæ Sulphas	$\frac{1}{8}$ gr. to $\frac{1}{2}$ gr.
Moschus	5 gr. to 10 gr.
Mucilago Acaciæ	ad libitum.
Mucilago Tragacanthæ	1 fl. oz. and upwards.
Myristica (in powder)	5 gr. to 15 gr.
Myrrh (in powder)	10 gr. to 30 gr.
Nux Vomica (in powder)	2 gr. to 5 gr.
Olea. Those omitted (if used internally) may be given in doses from	1 min. to 4 min.
Oleum Amygdalæ	1 fl. drm. to $\frac{1}{2}$ fl. oz.
Oleum Copaibæ	5 min. to 20 min.
Oleum Crotonis	$\frac{1}{3}$ min. to 1 min.
Oleum Cubebæ	5 min. to 20 min.
Oleum Morrhuæ	1 fl. drm. to 8 fl. drm.
Oleum Olivæ	1 fl. drm. to 1 fl. oz.
Oleum Phosphoratum	5 min. to 10 min.
Oleum Ricini	1 fl. drm. to 8 fl. drm.
Oleum Santali	10 min. to 30 min.
Oleum Terebinthinæ (as stimulant, and diuretic)	10 min. to 30 min.
Oleum Terebinthinæ (as an anthelmintic purgative)	2 fl. drm. to 4 fl. drm.
Oleo-Resina Cubebæ	5 min. to 30 min.
Opium (powdered)	$\frac{1}{2}$ gr. to 3 gr.
Oxymel	1 fl. drm. to 2 fl. drm.
Oxymel Scillæ	$\frac{1}{2}$ fl. drm. to 1 fl. drm
Pareira Radix (in powder)	30 gr. to 60 gr.
Pepsin	2 gr. to 5 gr.
Physostigmatis Semen	1 gr. to 4 gr.
Pilocarpinæ Nitras	$\frac{1}{20}$ gr. to $\frac{1}{2}$ gr.
Pilulæ. The dose of those omitted is from	5 gr. to 10 gr.
Pilula Ferri Carbonatis	5 gr. to 20 gr.
Pilula Ferri Iodidi	3 gr. to 8 gr.
Pilula Hydrargyri	3 gr. to 8 gr.
Pilula Phosphori	2 gr. to 4 gr.
Pilula Plumbi cum Opio	3 gr. to 5 gr.
Pilula Saponis Composita	3 gr. to 5 gr.
Pilula Scammonii Composita	5 gr. to 15 gr.

Pimenta (powder)	5 gr. to 20 gr.
Piper	5 gr. to 20 gr.
Piperin	5 gr. upwards.
Plumbi Acetas	1 gr. to 4 gr.
Podophylli Rhizoma (in powder)	10 gr. to 20 gr.
Podophylli Resina (Podophylline)	¼ gr. to 1 gr.
Potassa Sulphurata	2 gr. to 8 gr.
Potassii Acetas	10 gr. to 60 gr. or more.
Potassii Bicarbonas	10 gr. to 40 gr. or more.
Potassii Bromidum	5 gr. to 30 gr.
Potassii Carbonas	10 gr. to 30 gr.
Potassii Chloras	10 gr. to 30 gr.
Potassii Citras	20 gr. to 60 gr.
Potassii Iodidum	2 gr. to 20 gr.
Potassii Nitras	10 gr. to 30 gr.
Potassii Permanganas	1 gr. to 5 gr.
Potassii Sulphas (as a purgative)	15 gr. to 60 gr. or more.
Potassii Tartras	60 gr. to ½ oz.
Potassii Tartras Acida (as a diuretic)	20 gr. to 60 gr.
Potassii Tartras Acida (as a purgative)	120 gr. to 300 gr.
Pulvis Amygdalæ Compositus	60 gr. to 120 gr.
Pulvis Antimonialis	3 gr. to 5 gr.
Pulvis Catechu Compositus	20 gr. to 40 gr.
Pulvis Cinnamomi Compositus	3 gr. to 10 gr.
Pulvis Cretæ Aromaticus	10 gr. to 60 gr.
Pulvis Cretæ Aromaticus cum Opio	10 gr. to 40 gr.
Pulvis Elaterini Compositus	½ gr. to 5 gr.
Pulvis Glycyrrhizæ Compositus	30 gr. to 60 gr.
Pulvis Ipecacuanhæ Compositus	5 gr. to 15 gr.
Pulvis Jalapæ Compositus	20 gr. to 60 gr.
Pulvis Kino Compositus	5 gr. to 20 gr.
Pulvis Opii Compositus	2 gr. to 5 gr.
Pulvis Rhei Compositus	20 gr. to 60 gr.
Pulvis Scammonii Compositus	10 gr. to 20 gr.
Pulvis Tragacanthæ Compositus	20 gr. to 60 gr.
Quininæ Hydrochloras	1 gr. to 10 gr.
Quininæ Sulphas	1 gr. to 10 gr.
Quininæ Valerianas	1 gr. to 5 gr.
Rhei Radix	5 gr. to 20 gr.
Rhus Toxicodendron (powdered leaves)	½ gr. to 1 gr.
Sabinæ Cacumina	4 gr. to 10 gr.

Salicinum	3 gr. to 20 gr.
Santonica	10 gr. to 60 gr.
Santoninum	2 gr. to 6 gr.
Sapo Durus, or Sapo Mollis (as antacids)	5 gr. to 20 gr.
Scammoniæ Resina	3 gr. to 8 gr.
Scammonium (in powder)	5 gr. to 10 gr.
Scilla (in powder)	1 gr. to 3 gr.
Senegæ Radix (in powder)	20 gr. to 60 gr.
Serpentariæ Rhizoma (in powder)	10 gr. to 20 gr.
Sinapis (as an emetic)	1 drm. to ½ oz.
Soda Tartarata	¼ oz. to ½ oz.
Sodii Arsenias	$\frac{1}{16}$ gr. to ⅛ gr.
Sodii Bicarbonas	10 gr. to 60 gr.
Sodii Bromidum	10 gr. to 30 gr.
Sodii Carbonas	5 gr. to 30 gr.
Sodii Carbonas Exsiccata	3 gr. to 10 gr.
Sodii Citro-tartras Effervescens	60 gr. to ¼ oz.
Sodii Hypophosphis	5 gr. to 10 gr.
Sodii Iodidum	3 gr. to 10 gr.
Sodii Phosphas	¼ oz. to 1 oz.
Sodii Salicylas	10 gr. to 30 gr.
Sodii Sulphas	¼ oz. to 1 oz.
Sodii Sulphis	5 gr. to 20 gr.
Sodii Valerianas	1 gr. to 5 gr.
Spiritus. Those omitted may be given in doses from	½ fl. drm. to 1 fl. drm.
Spiritus Ætheris	30 min. to 90 min.
Spiritus Ætheris Compositus	30 min. to 2 fl. drm.
Spiritus Ætheris Nitrosi	30 min. to 2 fl. drm.
Spiritus Armoraciæ Compositus	1 fl. drm. to 2 fl. drm.
Spiritus Camphoræ	10 min. to 30 min.
Spiritus Chloroformi (Chloric Ether)	20 min. to 60 min.
Staphisagriæ Semina (powdered)	3 gr. to 10 gr.
Strychnina	$\frac{1}{30}$ gr. to $\frac{1}{12}$ gr.
Styrax Præparatus	5 gr. to 20 gr.
Succus Belladonnæ	5 min. to 15 min.
Succus Conii	½ fl. drm. to 1 fl. drm.
Succus Hyoscyami	½ fl. drm. to 1 fl. drm.
Succus Scoparii	1 fl. drm. to 2 fl. drm.
Succus Taraxaci	1 fl. drm. to 2 fl. drm.
Sulphuris Iodidum	½ gr. to 2 gr.
Sulphur Præcipitatum (as stimulant)	5 gr. to 10 gr. and upwards.

Sulphur Præcipitatum (as laxative)	30 gr. to 60 gr. and upwards.
Sulphur Sublimatum (as stimulant)	5 gr. to 10 gr. and upwards.
Sulphur Sublimatum (as laxative)	30 gr. to 60 gr. and upwards.
Sulphuris Iodidum	½ gr. to 2 gr.
Sulphydrate of Ammonium	3 min.
Syrupi. The dose of those omitted is	1 fl. drm.
Syrupus Chloral	½ fl. drm. to 2 fl. drm.
Syrupus Ferri Iodidi	½ fl. drm. to 1 fl. drm
Syrupus Rhei	1 fl. drm. to 4 fl. drm.
Syrupus Scillæ	½ fl. drm. to 1 fl. drm.
Syrupus Sennæ	1 fl. drm. to 4 fl. drm.
Tabellæ Nitroglycerini	1 or 2 tablets.
Tamarindus	½ oz. and upwards.
Terebinthinæ Canadensis	20 gr. to 30 gr.
Thymol	½ gr. to 2 gr.
Tincturæ. The dose of those omitted is from	½ fl. drm. to 2 fl. drm.
Tinctura Aconiti	5 min. to 15 min.
Tinctura Aloes	1 fl. drm. to 2 fl. drm.
Tinctura Asafœtidæ	½ fl. drm. to 1 fl. drm.
Tinctura Aurantii	1 fl. drm. to 2 fl. drm.
Tinctura Aurantii Recentis	1 fl. drm. to 2 fl. drm.
Tinctura Belladonnæ	5 min. to 20 min.
Tinctura Benzoini Composita	½ fl. drm. to 1 fl. drm.
Tinctura Buchu	1 fl. drm. to 2 fl. drm.
Tinctura Camphoræ Composita	15 min. to 1 fl. drm.
Tinctura Cannabis Indicæ	5 min. to 20 min.
Tinctura Cantharidis	5 min. to 20 min.
Tinctura Capsici	10 min. to 20 min.
Tinctura Chloroformi Composita	20 min. to 60 min.
Tinctura Chloroformi et Morphinæ	5 min. to 10 min.
Tinctura Cimicifugæ	15 min. to 60 min.
Tinctura Colchici Seminum	10 min. to 30 min.
Tinctura Conii	20 min. to 60 min.
Tinctura Digitalis	10 min. to 30 min.
Tinctura Ergotæ	5 min. to 30 min.
Tinctura Ferri Acetatis	5 min. to 30 min.
Tinctura Ferri Perchloridi	10 min. to 30 min.
Tinctura Gelsemii	5 min. to 20 min.
Tinctura Guaiaci Ammoniata	½ fl. drm. to 1 fl. drm.
Tinctura Hyoscyami	½ fl. drm. to 1 fl. drm.
Tinctura Iodi	5 min. to 20 min.
Tinctura Jaborandi	½ fl. drm. to 1 fl. drm.

Tinctura Laricis	20 min. to 30 min.
Tinctura Lobeliæ	10 min. to ½ fl. drm.
Tinctura Lobeliæ Ætherea	10 min. to ½ fl. drm.
Tinctura Myrrhæ	½ fl. drm to 1 fl. drm.
Tinctura Nucis Vomicæ	10 min. to 20 min.
Tinctura Opii	5 min. to 40 min.
Tinctura Opii Ammoniata	½ fl. drm. to 1 fl. drm.
Tinctura Podophylli	15 min. to 1 fl. drm.
Tinctura Rhei (as a stomachic)	1 fl. drm. to 2 fl. drm.
Tinctura Rhei (as a purgative)	4 fl. drm. to 8 fl. drm.
Tinctura Sabinæ	20 min. to 1 fl. drm.
Tinctura Scillæ	10 min. to 30 min.
Tinctura Sennæ	1 fl. drm. to 4 fl. drm.
Tinctura Stramonii	10 min. to 30 min.
Tinctura Sumbul	10 min. to 30 min.
Tinctura Tolutana	20 min. to 40 min.
Tinctura Valerianæ	1 fl. drm. to 2 fl. drm.
Tinctura Valerianæ Ammoniata	½ fl. drm. to 1 fl. drm.
Tinctura Veratri Viridis	5 min. to 20 min.
Tinctura Zingiberis	15 min. to 1 fl. drm.
Tinctura Zingiberis Fortior	5 min. to 20 min.
Tragacantha (powder)	20 gr. and upwards.
Trochisci. The dose of those omitted is from	*one* to *six*.
Trochisci Acidi Benzoici	*one* to *five*.
Trochisci Ipecacuanha	*one* to *three*.
Uvæ Ursi Folia (in powder)	10 gr. to 30 gr.
Valerianæ Rhizoma (in powder)	10 gr. to 30 gr.
Veratrina	$\frac{1}{70}$ gr. to $\frac{1}{16}$ gr.
Veratri Viridis Rhizoma (in powder)	1 gr. to 3 gr.
Vinum Aloes	1 fl. drm. to 2 fl. drm.
Vinum Antimoniale (in febrile affections)	5 min. to 1 fl. drm.
Vinum Antimoniale (as an emetic)	½ fl. oz. to 1 fl. oz.
Vinum Colchici	10 min. to 30 min.
Vinum Ferri	1 fl. drm. to 4 fl. drm.
Vinum Ferri Citratis	1 fl. drm. to 4 fl. drm.
Vinum Ipecacuanhæ (as an expectorant)	5 min. to 40 min.
Vinum Ipecacuanhæ (as an emetic)	3 fl. drm. to 6 fl. drm.
Vinum Opii	10 min. to 40 min.
Vinum Quininæ	½ fl. oz. to 1 fl. oz.
Vinum Rhei	1 drm. to 2 drm.

Zinci Acetas (as a tonic)	1 gr. to 2 gr.
Zinci Acetas (as an emetic)	10 gr. to 20 gr.
Zinci Carbonas	1 gr. to 10 gr.
Zinci Chloridum	½ gr. to 1 gr. or 2 gr.
Zinci Oxidum	2 gr. to 10 gr.
Zinci Sulphas (as a tonic or astringent)	1 gr. to 3 gr.
Zinci Sulphas (as an emetic)	10 gr. to 30 gr.
Zinci Valerianas	1 gr. to 3 gr.
Zingiber (in powder)	10 gr. to 20 gr. and upwards.

VI.

PROPORTIONS OF THE MORE IMPORTANT DRUGS IN OFFICIAL PREPARATIONS.

ANTIMONY.

(Tartar Emetic.)

2 gr. of tartarated antimony are contained in 1 fl. oz. of vinum antimoniale.

1 gr. of tartarated antimony is contained in 5 gr. of unguentum antimonii tartarati.

(Oxide of Antimony.)

1 gr. of oxide of antimony is contained in 3 gr. of pulvis antimonialis.

ARSENIUM.

(Arsenious Acid, White Arsenic.)

1 gr. of arsenious acid is contained in 100 fl. gr. of liquor arsenicalis.

1 gr. of arsenious acid is contained in 100 fl. gr. of liquor arsenici hydrochloricus.

(Arseniate of Sodium.)

1 gr. of arseniate of sodium (dried) is contained in 100 fl. gr. of liquor sodii arseniatis.

MERCURY.

(Metallic.)

1 gr. of mercury is contained in 3 gr. of hydrargyrum cum cretâ.

1 gr. of mercury is contained in 3 gr. of pilula hydrargyri.
1 gr. of mercury is contained in 2 gr. of unguentum hydrargyri.
1 gr. of mercury is contained in 4½ gr. of unguentum hydrargyri compositum.

(HYDRARGYRI PERCHLORIDUM.)

½ gr. of perchloride of mercury is contained in 1 fl. oz. of liquor hydrargyri perchloridi.

(HYDRARGYRI SUBCHLORIDUM, or CALOMEL.)

1 gr. of subchloride of mercury (calomel) is contained in 5 gr. of pilula hydrargyri subchloridi composita.
1 gr. of subchloride of mercury (calomel) is contained in about 6½ gr. of unguentum hydrargyri subchloridi.

HYDRATE OF CHLORAL.

10 gr. of hydrate of chloral are contained in 1 fl. drm. of syrupus chloral.

ACONITE.

54½ gr. of dried aconite root are contained in 1 fl. oz. of tinctura aconiti.

(ACONITINE.)

8 gr. of aconitine are contained in 1 oz. of unguentum aconitinæ.

BELLADONNA.

1 oz. of dried belladonna is contained in about 1 pint of tinctura belladonnæ.
Each fluid part of linimentum belladonnæ contains the active portion of a solid part of the dried root.

(ATROPINE.)

1 gr. of sulphate of atropine in 100 fl. gr. of liquor atropinæ sulphatis.
8 gr. of atropine are contained in 1 oz. of unguentum atropinæ.

CANNABIS INDICA.

22 gr. of extract of Indian hemp are contained in about 1 fl. oz. of tinctura cannabis Indicæ.

CANTHARIDES.

5½ gr. of cantharides are contained in about 1 fl. oz. of tincture of cantharidis.

COLCHICUM.

88 gr. of dried corm of colchicum are contained in 1 fl. oz. of vinum colchici.

54½ gr. of colchicum seeds are contained in 1 fl. oz. of tinctura colchici seminum.

DIGITALIS.

3 gr. of dried leaves of digitalis are contained in 1 fl. oz. of infusum digitalis, nearly.

54½ gr. of dried leaves of digitalis are contained in 1 fl. oz. of tinctura digitalis.

HEMLOCK.

54½ gr. of hemlock fruit are contained in 1 fl. oz. of tinctura conii.

IPECACUANHA.

22 gr. of ipecacuanha root are contained in 1 fl. oz. of vinum ipecacuanhæ.

1 gr. of ipecacuanha root is contained in *twelve* morphine and ipecacuanha lozenges.

1 gr. of ipecacuanha root is contained in four ipecacuanha lozenges.

NUX VOMICA.

15 per cent. of alkaloids are contained in extractum nucis vomicæ.

1 gr. of alkaloids is contained in 1 fl. oz. of tinctura nucis vomicæ.

(STRYCHNINE.)

1 gr. of strychnine is contained in 100 fl. gr. of liquor strychninæ hydrochloratis.

OPIUM.

(ACETATE OF MORPHINE.)

1 gr. of acetate of morphine is contained in 100 fl. gr. of liquor morphinæ acetatis.

1 gr. of acetate of morphine is contained in 10 min. of injectio morphinæ hypodermica.

(BIMECONATE OF MORPHINE.)

1¼ gr. of bimeconate of morphine are contained in 100 fl. gr. of liquor morphinæ bimeconatis.

(HYDROCHLORATE OF MORPHINE.)

1 gr. of hydrochlorate of morphine is contained in 100 fl. gr. of liquor morphinæ hydrochloratis.

1 gr. of hydrochlorate of morphine is contained in 1 fl. oz. of tinctura chloroformi et morphinæ.

1 gr. of hydrochlorate of morphine is contained in thirty-six morphine lozenges.

1 gr. of hydrochlorate of morphine is contained in thirty-six morphine and ipecacuanha lozenges.

½ gr. of hydrochlorate of morphine is contained in *each* morphine suppository.

½ gr. of hydrochlorate of morphine is contained in each morphine suppository with soap.

(OPIUM DRIED SUFFICIENTLY TO BE POWDERED.)

1 gr. of opium is contained in 14½ min. of tinctura opii.

1 gr. of opium is contained in ½ fl. oz. of tinctura camphoræ composita.

1 gr. of opium is contained in 96 min. of tinctura opii ammoniata.

1 gr. of opium is contained in 6 gr. of pilula saponis composita, nearly.

1 gr. of opium is contained in 8 gr. of pilula plumbi cum opio.

1 gr. of opium is contained in 23 gr. of pilula ipecacuanhæ cum scilla, nearly.

1 gr. of opium is contained in 10 gr. of pulvis ipecacuanhæ compositus.

1 gr. of opium is contained in 20 gr. of pulvis kino compositus.

1 gr. of opium is contained in 40 gr. of pulvis cretæ aromaticus cum opio.

1 gr. of opium is contained in 10 gr. of pulvis opii compositus.

1 gr. of opium is contained in about 13½ gr. of unguentum gallæ cum opio.

1 gr. of extract of opium is contained in *ten* opium lozenges.

1 gr. of opium equals about ½ gr. of extractum opii.

1 gr. of extract of opium is contained in 22 min. of extractum opii liquidum.

22 gr. of the extract are contained in one fl. oz. of vinum opii, nearly.

1 gr. of opium is contained in each compound lead suppository.

½ fl. drm. of the tincture is contained in 2 fl. oz. of enema opii.

LEEDS SCHOOL OF MEDICINE

INDEX.

Abietic Acid, 377
— Anhydride, 377
Absolute Alcohol, 152
Acacia, 257
— Catechu, 258
— Gummi, 257
Acetate of Ammonium, 50
— of Iron, 94
— of Lead, 117
— of Morphine, 193, 196
— of Potassium, 125
— of Sodium, 480
— of Zinc, 152
Acetic Acid, 29, 382
— Ether, 159
Acetum, 31
— Cantharides, 421
— Scillæ, 390
Acida, 3, 29, 438
Acidulous Waters, 478
Acidum Aceticum, 29
— — Dilutum, 29
— — Glaciale, 30
— Arseniosum, 62
— Benzoicum, 312
— Boricum, 31
— Carbolicum, 176
— — Liquefactum, 176
— Carbonicum, 32
— Chromicum, 33
— Citricum, 33
— Gallicum, 369
— Hydrobromicum Dilutum, 34
— Hydrochloricum, 35
— — Dilutum, 36
— Hydrocyanicum Dilutum, 36
— Lacticum, 39
— — Dilutum, 39
— Meconicum, 194
— Nitricum, 40
Acidum Nitricum Dilutum, 40
— Nitro - Hydrochloricum Dilutum, 40
— Oleicum, 316
— Phosphoricum Concentratum, 41
— Phosphoricum Dilutum, 42
— Salicylicum, 179
— Sulphuricum, 43
— — Aromaticum, 43
— Sulphuricum Dilutum, 43
— Sulphurosum, 44
— Tannicum, 369
— Tartaricum, 45
Aconella, 183
Aconite Leaves, 182
— Root, 183
Aconiti Folia, 182
— Radix, 183
Aconitina, 183
Aconitic Acid, 183
Aconitine, 183
Acotyledones, 405
Acrogenæ, 405
Actæa Racemosa, 185
Adeps Benzoatus, 412
— Præparatus, 412
Administration of Medicines, 427
Ærugo, 80
Æther, 157
— Aceticus, 159
— Compound Spirit of, 158
— Nitrous Spirit of, 160
— Purus, 158
— Spirit of, 158
— Sulphuricus, 157
Albumen Ovi, 413
Alcoholic and Ethereal Preparations, 152
Alcohol Amylicum, 167
— Ethylicum, 152
Alexandrian Senna, 252

Alkaline Remedies, 436
— Waters, 477
Alkaloidea, 4
Almond, Bitter, 261
— Oil, 261
— Sweet, 261
Almonds, Jordan, 261
Aloe Barbadensis, 391
— Socotrina, 391
Aloes, 391
Aloetic Acid, 392
Aloin, 391
Alteratives, 441
Alum, 53
Alumen, 53
— Exsiccatum, 54
Aluminium, 53
Amidin, 400
Ammoniacum, 277
— and Mercury Plaster, 96
— Mixture, 277
— Plaster with Mercury, 277
Ammoniæ, Linimentum, 47
— Liquor, 47
— — Fortior, 46
— Spiritus Aromaticus, 48
Ammoniated Mercury, 102
— Tincture of Guaiacum, 232
— Tincture of Opium, 202
— Tincture of Quinine, 289
— Tincture of Valerian, 301
Ammonii Acetatis Liquor, 51
— — — Fortior, 50
— Benzoas, 313
— Bromidum, 50
— Carbonas, 48
— Chloridum, 49
— Citratis Liquor, 51
— — — Fortior, 51
— Nitras, 52
— Phosphas, 52
Ammonio-Chloride of Mercury, 102
— Citrate of Iron, 92
Ammonium, 46
Amygdala Amara, 261
— Dulcis, 261
Amygdaline, 262
Amyl Nitris, 168
Amylic Alcohol, 167
Amylum, 399
Amyridaceæ, 240
Anacardiaceæ, 239
Anæsthetics, 444
Analeptic Tonics, 436
Anaphrodisiacs, 467
Anethi Fructus, 280
— Oleum, 280
Angustura Bark, 234
— — False, 323
Anise Fruit, 278
— Oil, 278
— Water, 278
Anisi Fructus, 278
— Stellati Fructus, 189
Annelida, 424
Anodynes, 443
Antacids, 436
Anthelmintics, 455
Anthemidis Flores, 305
— Oleum, 306
Antidotes, 473
Antimonial Wine, 57
— Powder, 58
Antimonii Chloridi Liquor, 59
— Oxidum, 58
— Potassio-Tartras, 56
Antimonium, 55
— Nigrum Purificatum, 55
— Sulphuratum, 55
— Tartaratum, 56
Antimony, 55
— Black, Purified, 55
Antiperiodics, 446
Antipyretics, 440
Antiseptics, 474
Antispasmodics, 446
Apetalæ, 350
Aphrodisiacs, 467
Apocodeine, 198, 207
Apomorphinæ Hydrochloras, 194
Apomorphine, 195, 207
Aqua, 28
— Anethi, 281
— Anisi, 278
— Aurantii Floris, 220
— Camphoræ, 355
— Carui, 280
— Chloroformi, 162
— Cinnamomi, 354
— Destillata, 28
— Fœniculi, 279
— Fortis, 40

Aqua Laurocerasi, 263
— Menthæ Piperitæ, 348
— — Viridis, 349
— Pimentæ, 266
— Rosæ, 259
— Sambuci, 282
Aquæ, 4
Arabine, 243
Araroba Powder, 251
Argenti et Potassii Nitras, 60, 130
— Nitras, 60
— Oxidum, 61
Argentum, 59
— Purificatum, 59
Arica Bark, 286
Aricine, 286
Aristolochiæ, 358
Armoraciæ Radix, 215
Arnicæ Rhizoma, 308
Aromatic Mixture of Iron, 81
— Powder of Chalk, 74
— — and Opium, 202
— Spirit of Ammonia, 48
— Sulphuric Acid, 43
Arseniate of Iron, 86
— of Quinine, 288
— of Sodium, 65
Arsenic, 62
— Hydrochloric Solution of, 65
— White, 62
Arsenical Solution, 63
Arsenici Liquor Hydrochloricus, 65
Arsenicum, 62
Arsenii et Hydrargyri Iodidi Liquor, 67
— Iodidum, 66
Arsenious Acid, 62
Artanthic Acid, 365
Articles employed in Chemical testing, 480
Asafœtida, 275
Asclepiadaceæ, 325
Ash, Common, 319
Asparagine, 242
Astringents, 438
— Local, 471
Atropaceæ, 332
Atropina, 332
Atropine, 332
Atropinæ Sulphas, 334
Attar of Roses, 259
Aurantiaceæ, 220
Aurantii Cortex, 220
Aurantii Fructus, 220
Aves, 413

Bael Fruit, 223
Balsamum Peruvianum, 246
— Tolutanum, 247
Bang, 374
Barbadoes Aloes, 391
Barley, 401
— Sugar, 404
Barosma, 233
Bassorine, 242
Baths, Water and Sand, 12
Bearberry Leaves, 310
Bebeeru Bark, 357
Beberine, 357
Beberinæ Sulphas, 357
Beer Yeast, 156
Belæ Fructus, 223
Belladonna and Opium, Antagonistic Properties of, 334
Belladonna Leaves, 332
— Root, 332
Belladonnæ Folia, 332
— Radix, 332
Benzoate of Ammonium, 313
Benzoic Acid, 312
Benzoin, 312
Benzoinum, 312
Benzol, 480
Benzolated Amylic Alcohol, 480
Benzoline, 481
Berberine, 189
Bezoars, 371
Biborate of Sodium, 143
Bicarbonate of Potassium, 124
— of Sodium, 139
Bichloride of Methylene, 167
Bichromate of Potassium, 135
Bile (Ox), 409
Bismuth, 67
— Lozenges, 69
Bismuthi Carbonas, 71
— Citras, 70
— et Ammonii Citras, 70
— Oxidum, 68
— Subnitras, 68
Bismuthum, 67
— Purificatum, 67
Black Antimony, Purified, 55
— Catechu, 258
— Oxide of Manganese, 115
Blistering Agents, 469
— Collodion, 220
Blood Restoratives, 436

Blood Tonics, 436
Blue Gum Tree, 267
— Ointment, 96
— Pill, 95
Bone Black, 16
Borax, 143
Boric Acid, 31
— — Ointment, 32
Borneéne, 301
Borneo Camphor, 356
Botany Bay Kino, 268
Brandy, 154
Brassicaceæ, 213
Brazilian Cocoa, 224
Bread (Wheaten), 399
Broom Tops, 244
Bromide of Ammonium, 50
— of Potassium, 134
— of Sodium, 145
Bromine, 24
Bromum, 24
Brucine, 320
Buchu Folia, 233
— Leaves, 233
Buck-bean, 328
Burgundy Pitch, 381
Burnett's Solution, 150
Burnt Alum, 54
Burnt Sponge, 425
Butyl-Chloral Hydrate, 172
Byttneriaceæ, 224

CABBAGE ROSE PETALS, 259
Cacao Butter, 224
Cade Oil, 383
Cadmii Iodidum, 71
Cadmium, 71
Cæsalpinieæ, 251
Caffeina, 227
Caffeinæ Citras, 228
Caffeine, 227
Cajuput Oil, 266
Calabar Bean, 248
Calamina Præparata, 148
Calamine, 148
Calcii Carbonas Præcipitata, 73
— Chloridum, 75
— Hydras, 73
— Hypophosphis, 77
— Phosphas, 77
— Sulphas, 76
Calcium, 72
Calisaya Bark, 285
Calx Sulphurata, 76
Calomel, 100
Calumba, 189
Calumbæ Radix, 189
Calumbic Acid, 189
Calumbin, 189
Calx, 72
— Chlorinata, 75
Calycifloræ, 238
Cambogia, 228
Camelliaceæ, 226
Camphine, 377
Camphor, 355
— Borneo, 356
Camphora, 355
Canada Balsam, 379
— Turpentine, 379
Cane Sugar, 404
Canella Alba Bark, 229
Canellaceæ, 229
Canellæ Cortex, 229
Cannabin, 374
Cannabinaceæ, 374
Cannabis Indica, 374
Cantharides, 420
Cantharadin, 421
Cantharis, 420
Caprifoliaceæ, 282
Capsici Fructus, 331
Capsicin, 332
Capsicum Fruit, 331
Caraway Fruit, 280
— Oil, 280
Carbo, 15
— Animalis, 16
— — Purificatus, 16
— Ligni, 15
Carbolic Acid, 176
— — Glycerine of, 177
Carbon, 15
Carbonate of Ammonium, 48
— of Bismuth, 71
— of Lead, 119
— of Lime, Precipitated, 73
— of Lithium, 108
— of Magnesium, heavy, 112
— — light, 112
— of Potassium, 123
— of Sodium, 138
— — dried, 138
— of Zinc, 151
Carbonated Saline Waters, 478
Carbonic Acid, 32
Cardamoms, 385
Cardamomi Semina, 385
Carminatives, 458

Carmine, 420
Carminic Acid, 420
Carui Fructus, 280
— Oleum, 280
Carvene, 280
Carvol, 280
Caryophylli Oleum, 265
Caryophylline, 265
Caryophyllum, 265
Cascara Sagrada, 238
Cascarilla Bark, 360
Cascarillæ Cortex, 360
Cascarillin, 360
Cassia (Senna), 253
— Bark, 355
Cassiæ Pulpa, 254
Castor Oil, 362
Cataplasma Carbonis, 15
— Conii, 273
— Fermenti, 156
— Lini, 218
— Sinapis, 214
— Sodæ Chlorinatæ, 144
Cataplasmata, 4
Catechin, 245, 299
Catechu, 299
— Nigrum, 258
— Pallidum, 299
Catechuic Acid, 299
Catechu-tannic Acid, 245, 299
Cathartics, 452
Cathartin, 253
Caustic Potash, 123
— Soda, 137
Caustics, 472
Centaury, 327
Cephaelic Acid, 297
Cera Alba, 418
— Flava, 418
Cerevisiæ Fermentum, 156
Cerii Oxalas, 78
Cerium, 78
Cerolein, 419
Cerotic Acid, 419
Cetacea, 413
Cetaceum, 413
Cetraria, 406
Cetraric Acid, 406
Cetrarin, 406
Cetylic Alcohol, 413
Cevadilla, 395
Cevadine, 395
Chalk, 74
— Mixture, 74
— Prepared, 74
Chalybeate Plaster, 89
Chalybeate Waters, 475
Chamomile Flowers, 305
— Oil, 306
Charcoal, 15
— Animal, 16
— Poultice, 15
— Vegetable, 15
Charta Epispastica, 421
— Sinapis, 214
Cherry Laurel Leaves, 263
Chillies, 331
Chinic Acid, 284
Chirata, 327
Chiretta, 327
Chloral Hydras, 170
Chlorate of Potassium, 130
Chloric Ether, 166
Chloride of Ammonium, 49
— of Antimony, Solution of, 59
— of Barium, 480
— of Calcium, 75
— of Silver, 62
— of Sodium, 145
— of Tin, 147
— of Zinc, 149
Chlorinated Lime, 75
— Soda, Solution of, 144
Chlorine, 26
— Poultice, 144
Chloroformum, 161
Cholagogues, 452
Cholesterin, 410
Chromic Acid, 33
Chrysammic Acid, 392
Chrysarobin, 251
Chrysarobinum, 251
Chrysolepic Acid, 392
Chrysophane, 351
Chrysophanic Acid, 351
Churrus, 374
Cimicifuga, 188
Cimicifugæ Rhizoma, 188
Cinchona Acids, Action of, 292
— Alkaloids, Action of, 290
— Bark, 282
— — Grey or Huanuco, 292
— — Pale, or Loxa, 292
— — Red, 283
— — Tests for, 294
— — Yellow or Calisaya, 292
— Barks, Action of, different kinds of, 292

Cinchona Barks, Adulteration of, 293
Cinchonaceæ, 282
Cinchona-red, 284
Cinchonæ Cortex, 282
— Rubræ Cortex, 283
Cinchonicine, 286
Cinchonidinæ Sulphas, 283, 287
Cinchoninæ Sulphas, 283, 288
Cinchonidine, 285
Cinchonine, 285
Cinnabar, Artificial, 106
Cinnamein, 246
Cinnamic Acid, 247, 354, 368
— Aldehyde, 354
Cinnamomi Cortex, 353
— Oleum, 354
Cinnamon Bark, 353
— Oil, 354
Cinnamyl, Hydride of, 354
Cissampeline, 190
Citrate of Ammonium, 51
— of Bismuth, 70
— of Bismuth and Ammonium, 70
— of Caffeine, 228
— of Iron and Ammonium, 92
— of — and Quinine, 93, 288
— of Lithium, 109
— of Magnesium, Solution of, 113
— of Potassium, 126
Citric Acid, 33
Citro-tartrate of Sodium, effervescent, 146
Classification of Medicines, 433
Clove, 265
Coca, 225
Cocainæ Hydrochloras, 225
Cocaine, 225
Cocculinic Acid, 192
Cocculus, 191
— Indicus, 191
Coccus, 419
Cochineal, 419
Cod Liver Oil, 414
Codamine, 195, 198
Codeia, 193
Codeina, 193
Codeine, 193, 197, 206
Colchici Cormus, 397
— Semina, 397
Colchicine, 398
Colchicum Corm and Seeds, 397
Coleoptera, 420
Collodion, 219
Collodium, 219
— Flexile, 219
— Vesicans, 220
Colocynth Pulp, 269
Colocynthidis Pulpa, 269
Colocynthin, 269
Colutea arborescens, 253
Common Salt, 145
Compositæ, 303
Condurango, 326
Confectio Gallicæ, 260
— Opii, 201
— Piperis, 364
— Rosæ Caninæ, 261
— Scammonii, 329
— Sennæ, 253
— Sulphuris, 18
— Terebinthinæ, 378
Confectiones, 5
Coniferæ, 377
Conhydrine, 272
Conine, 272
Conii Folia, 272
— Fructus, 272
Conserves, 5
Convolvulaceæ, 328
Convolvulin, 330
Copaiba, 255
Copaibæ Oleum, 255
Copaiva, 255
Copaivic Acid, 256
Copper, 79
— Foil, 480
Coriander Fruit, 279
— Oil of, 279
Coriandri Fructus, 279
Coriaria Myrtifolia, 253
Cornutine, 402
Corrosive Sublimate, 101
Cotarnine, 195
Cotton Wool, 218
Cowhage, 244
Cream of Tartar, 128
Creasote, Mixture of, 175
Creasotum, 175
Creta, 74
— Præparata, 74
Crocus, 386
Croton-Chloral Hydrate, 172
— Oil, 361
Crotonic Acid, 361
Cruciferæ, 213
Crumb of Bread, 399
Cryptopine, 198, 206

Cubeba, 364
Cubebic Acid, 364
Cubebin, 364
Cubeb Pepper, 364
Cubebs, 364
— Oil of, 364
— Oleo-Resin of, 364
Cucurbitaceæ, 269
Cupri Nitras, 80
— Sulphas, 79
Cuprum, 79
Cupuliferæ, 368
Curd Soap, 315
Cusparia Bark, 234
Cuspariæ Cortex, 234
Cusparine, 234
Cusso, 264
Cynanchum Argel, 253
Cyanide of Potassium, 135
Cytisin, 309

DAMASK ROSE, 259
Dandelion Root, 306
Daphnin, 359
Datura Stramonium, 340
— Tatula, 341
Daturine, 340
Deadly Nightshade, 332
Decocta, 5
Decoctum Aloes Compositum, 392
— Cetrariæ, 406
— Cinchonæ, 288
— Granati Radicis, 269
— Hæmatoxyli, 252
— Hordei, 401
— Papaveris, 192
— Pareiræ, 191
— Quercûs, 369
— Sarsæ, 389
— — Compositum, 389
— Scoparii, 244
— Taraxaci, 307
Delphinine, 187
Dextrin, 400
Dialysed Iron, Solution of, 90
Diaphoretics, 461
Digitaleïn, 344
Digitalin, 344
Digitalis Folia, 344
Digitin, 344
Digitonin, 344
Digitoxin, 344
Distilled Water, 28
Discs of Atropine, 334
— of Cocaine, 226
Discs of Physostigmine, 248
Dill Fruit, 280
— Oil of, 280
Disinfectants, 474
Diuretics, 463
Dog Rose, 261
Donovan's Solution, 67
Dover's Powder, 202, 297
Drastics, 452

EAST INDIAN SENNA, 252
Ecballii Fructus, 270
Ecbolics, 466
Ecgonine, 226
Egg Albumen, 413
— Flip, 414
Elaterin, 270
Elaterinum, 270
Elaterium, 270
Elder-flowers, 282
Electuaries, 5
Elemi, 241
Ellagic Acid, 370
Embrocations, 8
Emetics, 451
Emetine, 297
Emmenagogues, 466
Emollients, 471
Emplastrum Ammoniaci cum Hydrargyro, 96, 277
— Belladonnæ, 334
— Calefaciens, 421
— Cantharidis, 421
— Ferri, 89
— Galbani, 277
— Hydrargyri, 95
— Opii, 201
— Picis, 381
— Plumbi, 116
— — Iodidi, 117
— Resinæ, 378
— Saponis, 315
— — Fuscum, 315
Endogenæ, 384
Enema Aloes, 392
— Asafœtidæ, 275
— Catharticum, 114
— Magnesii Sulphatis, 114
— Opii, 201
— Terebinthinæ, 378
Epispastics, 469
Epsom Salts, 114
Equivalent Weights, 13
Ergot (of Rye), 401
Ergota, 401

Ergotin, 402
Ergotinic Acid, 402
Ergotinum, 402
Ericaceæ, 310
Errhines, 459
Erythræa Centaureum, 327
Erythroxylaceæ, 225
Escharotics, 472
Eserine, 248
Essentia Anisi, 278
— Menthæ Piperitæ, 348
Essentiæ, 5
Ether, 157
— , Pure, 158
Ethyl acetate, 159
Ethylate of Sodium, Solution of, 147
Ethylic Alcohol, 152, 480
Eucalyptol, 267
Eucalpti Folia, 267
Eugenic Acid, 265
Eugenine, 265
Euphorbiaceæ, 360
Exhilarants, 442
Exogenæ, 182
Expectorants, 460
Extracta, 5
Extractum Aconiti, 184
— Aloes Barbadensis, 392
— — Socotrinæ, 393
— Anthemidis, 306
— Belæ Liquidum, 223
— Belladonnæ, 333
— — Alcoholicum, 334
— Calumbæ, 189
— Cannabis Indicæ, 374
— Cascaræ Sagradæ, 239
— — — Liquidum, 239
— Cimicifugæ Liquidum, 188
— Cinchonæ Liquidum, 289
— Cocæ Liquidum, 226
— Colchici, 398
— — Aceticum, 398
— Colocynthidis Compositum, 269
— Conii, 273
— Ergotæ Liquidum, 402
— Filicis Liquidum, 405
— Gelsemii Alcoholicum, 324
— Gentianæ, 327
Extractum Glycyrrhizæ, 242
— — Liquidum, 242
— Hæmatoxyli, 252
— Hyoscyami, 342
— Jaborandi, 235
— Jalapæ, 331
— Krameriæ, 217
— Lactucæ, 308
— Lupuli, 376
— Mezerei Æthereum, 359
— Nucis Vomicæ, 321
— Opii, 201
— — Liquidum, 201
— Papaveris, 192
— Pareiræ, 191
— — Liquidum, 191
— Physostigmatis, 248
— Quassiæ, 237
— Rhamni Frangulæ, 238
— — — Liquidum, 238
— Rhei, 351
— Sarsæ Liquidum, 389
— Stramonii, 340
— Taraxaci, 307
— — Liquidum, 307

FABA Sancti Ignatii, 323
Farina Tritici, 399
Fel Bovinum Purificatum, 409
Fennel Fruit, Sweet, 279
— Water, 279
Fer Réduit, 83
Fern (Male Shield), 405
Ferri Acetatis Liquor, 94
— — — Fortior, 94
— — Tinctura, 94
— Arsenias, 87
— Carbonas Saccharata, 84
— Dialysatus Liquor, 90
— et Ammonii Citras, 92
— et Quininæ Citras, 93
— Iodidum, 85
— Perchloridi Liquor, 90
— — — Fortior, 90
— — Tinctura, 91
— Pernitratis Liquor, 91
— — Hydratum, 89
— Persulphatis Liquor, 91
— Phosphas, 88

Ferri Potassio-Tartras, 93
— Sulphas, 86
— — Exsiccata, 86
— — Granulata, 86
Ferricyanide of Potassium, 480
Ferrocyanide of Potassium, 135
Ferruginous Waters, 475
Ferrum, 81
— Redactum, 83
— Tartaratum, 93
Ficus, 373
Fig, 373
Filices, 405
Filix Mas, 405
Fir-Wool Oil, 381
Flax, 217
Flexible Collodion, 219
Flour, Wheaten, 399
Flowers of Sulphur, 17
Fluid Magnesia, 113
Fœniculi Fructus, 279
Fousel Oil, 167
Fowler's Solution, 63
Foxglove Leaves, 344
Frangula Bark, 238
Frangulin, 238
Frankincense, 380
Fraxinus Excelsior, 319
French Rose, 260
Friar's Balsam, 313

GADUIN, 416
Gadus, Species of, 414
Galbanum, 276,
— Plaster, 277
Galla, 369
Gallic Acid, 369
Galls, 369
Gamboge, 228
Gambogic Acid, 229
Ganga, 374
Gelsemine, 324
Gelseminic Acid, 324
Gelsemium, 324
Gentianaceæ, 326
Gentian Root, 326
Gentianæ Radix, 326
Gentianic Acid, 326
Gentianin, 326
Gentianite, 326
Ginger, 384
Glacial Acetic Acid, 30
Glauber's Salts, 140
Glonoine, 169
Glucose, 400
Gluten, 400
Glycerina, 7
Glycerine, 317
Glycerinum, 317
— Acidi Carbolici, 177, 318
— Acidi Gallici, 318, 371
— Acidi Tannici, 318, 371
— Aluminis, 54, 318
— Amyli, 318, 400
— Boracis, 143, 318
— Plumbi Subacetatis, 119, 318
— Tragacanthæ, 243, 318
Glycocholate of Sodium, 410
Glycocholic Acid, 410
Glycyrretin, 242
Glycyrrhiza, 242
Glycyrrhizæ, pulvis compositus, 242
Glycyrrhizine, 242
Goa Powder, 251
Gold, Fine, 480
Gossypium, 218
Graminaceæ, 399
Granati Radicis Cortex, 268
Granulated Sulphate of Iron, 86
— Tin, 147, 483
— Zinc, 148
Gregory's Powder, 351
Grey Powder, 95
Griffiths' Mixture, 85
Guaiaci Lignum, 231
— Resina, 231
Guaiacic Acid, 231
Guaiaconic Acid, 232
Guaiacum Mixture, 232
— Resin, 231
— Wood, 231
Guaiaretic Acid, 231
Guarana, 224
Guaranine, 224
Guarina, 227
Guinea Pepper, 331
Gum Acacia, 257
Gummic Acid, 257
Gun Cotton, 219
Gunjah, 374
Gutta Percha, 311
Guttiferæ, 228

HÆMATOXYLI LIGNUM, 251

Hæmatoxylin, 252
Hard Paraffin, 181
— Soap, 314
Hashish, 374
Hellebore Rhizome, Green, 394
Hemidesmic Acid, 325
Hemidesmi Radix, 325
Hemidesmus Root, 325
Hemiptera, 419
Hemlock Leaves and Fruit, 272
— Poultice, 273
Hemp (Indian), 248
Henbane Leaves, 341
Hepar Sulphuris, 135
Hepatic Waters, 476
Hesperidin, 222
Hiera Picra, 230
Hips, 261
Hirudo, 424
Hoffmann's Anodyne, 158
Hog's Lard, 412
Honey, 418
— of Borax, 143
Hop, 375
Hordeum Decorticatum, 401
Horseradish Root, 215
Huile de Cade, 383
Humulin, 376
Hundred-leaved Rose, 259
Hydragogue Purgatives, 452
Hydrargyri Bisulphuretum, 106
— Iodidum Rubrum, 103
— Nitratis Liquor Acidus, 106
— Nitrico-Oxidum, 105
— Oxidum Flavum, 104
— — Rubrum, 105
— Perchloridum, 101
— Persulphas, 107
— Subchloridum (Calomel), 100
— Sulphuretum, 106
Hydrargyrum, 95
— Ammoniatum, 102
— cum Cretâ, 95
Hydrate of Butyl-Chloral, 172
— of Cetyl, 413
— of Chloral, 170
— of Sodium, 137
Hydrated Peroxide of Iron, 89
Hydrobromic Acid, Dilute, 34
Hydrocarbons, 175
Hydrochlorate of Apomorphine, 194, 196
— of Cinchonine, 288
— of Cocaine, 225
Hydrochlorate of Morphine, 193, 196
— of Quinine, 283, 287
— of Trimethylamin, 417
Hydrochloric Acid, 35
— Solution of Arsenic, 65
Hydrocyanic Acid, Dilute, 36
Hydrogen, 15
— Peroxide of, 15
Hymenoptera, 418
Hyoscyami Folia, 341
Hyoscyamine, 342
Hypophosphite of Calcium, 77
— of Sodium, 142
Hyposulphite of Sodium, 141, 481

Iceland Moss, 406
Igasuric Acid, 320
Igasurine, 320
Illicium Anisatum, 189
Incompatibility, 429
Indian Hemp, 374
— Poke, 394
— Sarsaparilla, 325
Indicators of the Termination of Reactions in Volumetric Operations, 502
Indifferent Thermal Waters, 478
Indigo, 259, 481
Indigotin, 259
Infusa, 8
Infusum Anthemidis, 306
— Aurantii, 220
— — Compositum, 220
— Buchu, 233
— Calumbæ, 190
— Caryophylli, 265
— Cascarillæ, 360
— Catechu, 299
— Chiratæ, 327
— Cinchonæ Acidum, 289
— Cuspariæ, 234
— Cusso, 264
— Digitalis, 344
— Ergotæ, 402
— Gentianæ Compositum, 327
— Jaborandi, 235
— Krameriæ, 217
— Lini, 218
— Lupuli, 376

Infusum Maticæ, 365
— Quassiæ, 237
— Rhei, 351
— Rosæ Acidum, 260
— Senegæ, 216
— Sennæ, 253
— Serpentariæ, 359
— Uvæ Ursi, 310
— Valerianæ, 301
Inhalation, 432
Inhalations, 11
Injectio Apomorphinæ Hypodermica, 204
— Ergotina Hypodermica, 402
— Morphinæ, 203
Insecta, 418
Iodide of Ammonium, 53
— of Arsenium, 66
— of Cadmium, 71
— of Iron, 85
— of Lead, 116
— of Potassium, 132
— of Sodium, 145
— of Sulphur, 23
Iodine, 21
Iodoformum, 166
Iodum, 21
Ipecacuanha, 296
Ipecacuanhic Acid, 297
Iridaceæ, 386
Iron, 81
— Wire, 81
Irritants, 469
Isinglass, 481
Isopelletierine, 269

JABORANDI, 235
Jaborine, 235
Jalap, 330
— Resin, 330
Jalapa, 330
Jalapæ Resina, 330
Jalapin, 328, 330
James's Powder, 58
Japonic Acid, 299
Jervine, 395
Jordan Almonds, 261
Juices, 9
Juniper Oil, 382
Juniperi Oleum, 382

KALIUM, 120
Kamala, 362
Kino, 245
Koussine, 264
Kousso, 264
Krameriæ Radix, 216
Krameric Acid, 217
Kreasote, 175

LABIATÆ, 346
Lac, 408
— Sulphuris, 17
Lactic Acid, 39
— — Dilute, 39
Lactose, 409
Lactuca, 308
Lactucarium, 308
Lactucic Acid, 308
Lactucine, 308
Lactucone, 308
Lamellæ Atropinæ, 334
— Cocainæ, 226
— Physostigminæ, 248
Lanthopine, 198
Larch Bark, 380
Lard, Prepared, 412
Laricis Cortex, 380
Larixin, 380
Larixinic Acid, 380
Laudanine, 198
Lauraceæ, 353
Laurel Water, 263
Laurocerasi Folia, 263
Lavandulæ Oleum, 347
Lavender Oil, 347
Laxatives, 452
Lead, 116
— Plaster, 116
Leaf Tobacco, 343
Leech, 424
Leguminosæ, 242
Lemon Juice, 221
— Oil, 221
— Peel, 221
Lettuce, Wild, 308
Lichenes, 406
Lichenin, 406
Lignum Vitæ, 231
Liliaceæ, 390
Lime, 72
— Slaked, 73
— Water, 73
Limonade Purgative, 113
Limonis Cortex, 221
— Oleum, 221
— Succus, 221
Linaceæ, 217

Lini Farina, 217
— Oleum, 217
— Semina, 217
Linimenta, 8
Linimentum Aconiti, 184
— Ammoniæ, 47
— Belladonnæ, 334
— Calcis, 73
— Camphoræ, 355
— — Compositum, 355
— Cantharidis, 421
— Chloroformi, 162
— Crotonis, 361
— Hydrargyri, 96
— Iodi, 21
— Opii, 201
— Potassii Iodidi cum Sapone, 133
— Saponis, 315
— Sinapis Compositum, 214
— Terebinthinæ, 378
— — Aceticum, 378
Linseed, 217
— Meal, 217
— Oil, 217
— Poultice, 218
Liquidambaraceæ, 367
Liquor Acidi Chromici, 33
— Ammoniæ, 47
— — Fortior, 46
— Ammonii Acetatis, 51
— — — Fortior, 50
— — Citratis, 51
— — — Fortior, 51
— Antimonii Chloridi, 59
— Arsenicalis, 63
— Arsenici Hyrochloricus, 65
— Arsenii et Hydrargyri Iodidi, 67
— Atropinæ Sulphatis, 334
— Bismuthi et Ammonii Citratis, 70
— Calcii Chloridi, 75
— Calcis, 73
— — Chlorinatæ, 75
— — Saccharatus, 73
— Chlori, 27
— Epispasticus, 421
— Ferri Acetatis, 94
— — — Fortior, 94
— — Perchloridi, 90
Liquor Ferri Perchloridi Fortior, 90
— — Pernitratis, 91
— — Persulphatis, 91
— Gutta Percha, 312
— Hydrargyri Nitratis Acidus, 106
— Hydrargyri Perchloridi, 102
— Iodi, 21
— Lithiæ Effervescens, 108
— Magnesii Carbonatis, 113
— — Citratis, 113
— Morphinæ Acetatis, 203
— — Bimeconatis, 204
— — Hydrochloratis, 203
— Plumbi Subacetatis, 118
— — — dilutus, 119
— Potassæ, 121
— — Arsenitis, 63
— — Effervescens, 125
— Potassii Permanganatis, 132
— Sodæ, 137
— — Chlorinatæ, 144
— — Effervescens, 139
— Sodii Arseniatis, 66
— Strychninæ Hydrochloratis, 321
— Zinci Chloridi, 150
Liquores, 8
Liquorice, 242
Litharge, 116
Lithia Water, 108
Lithii Carbonas, 108
— Citras, 109
Lithium, 108
Lithontriptics, 463
Litmus, 481
— Paper, Blue and Red, 481
Lobelia, 309
Lobeliaceæ, 309
Lobelic Acid, 310
Lobelina, 310
Loganiaceæ, 320
Logwood, 251
Lotio Hydrargyri Flava, 102
— — Nigra, 100
Lozenges, 11
Lupulin, 375
Lupulinic Glands, 375
Lupulinum, 375

Lupulite, 376
Lupulus, 375

MAGNESIA Levis, 110
— Ponderosa, 110
Magnesii Carbonas Levis, 112
— — Ponderosa, 112
— Citratis, Liquor, 113
— Sulphas, 114
Magnesium, 110
Magnoliaceæ, 189
Male Fern, 405
— — Oil, 405
Malic Acid, 340, 342, 343
Malvaceæ, 218
Mammalia, 407
Manganese, 115
Manganesii Oxidum Nigrum, 115
Manganesium, 115
Manila Elemi, 241
Manna, 319
Mannite, 307, 319
Margarin, 415
Marmor Album, 74
Mastiche, 239
Mastichic Acid, 239
Masticine, 239
Maticæ Folia, 365
Matico Leaves, 365
Meadow Sweet, 366
Meconic Acid, 194, 207
Meconidine, 198
Meconine, 199, 207
Medicine, Administration of, 427
— Classification of, 433
Mel, 418
— Boracis, 143
— Depuratum, 418
Melanthaceæ, 394
Menispermaceæ, 189
Menispermine, 192
Menthæ Piperitæ Oleum, 348
Menthol, 348
Menthylic Alcohol, 348
Menyanthes Trifoliata, 327
Mercurial Lotion, Black, 100
— — Yellow, 102
— Ointment, 96
— Pill, 95
— Plaster, 95
— Suppositories, 96
Mercuric Iodide, 103
Mercury, 95
Mercury, with Chalk, 95
— Liniment, 96
— Ointment, Compound, 96
Metacinnamein, 247
Methyl Alcohol, 382
— Conine, 272
Mezerei Cortex, 359
Mezereon Bark, 359
Mica Panis, 399
Milk, 408
— of Sulphur, 17
Mimoseæ, 257
Mimo-Tannic Acid, 245
Mineral Waters, 475
Miscellaneous Waters, 479
Mistura Ammoniaci, 277
— Amygdalæ, 262
— Camphoræ, 355
— Creasoti, 175
— Cretæ, 74
— Ferri Aromatica, 81
— — Composita, 84
— Guaiaci, 232
— Scammonii, 329
— Sennæ Composita, 253
— Spiritus Vini Gallici, 154
Misturæ, 9
Mitigated Caustic, 60, 130
Molasses, 404
Monkshood, 182
Moraceæ, 373
Mori Succus, 373
Morphiæ Hydrochloras, 193
— Murias, 193
Morphinæ Acetas, 193
— Hydrochloras, 193
— Sulphas, 193
Morphine, 193, 195, 205
Morrhuæ Oleum, 414
Moschus, 407
Mucic Acid, 258
Mucilage of Starch, 502
Mucilagines, 9
Mucilago Acaciæ, 258
Amyli, 400
— Tragacanthæ, 243
Mucuna, 244
Mulberry Juice, 373
Musk, 407
— Root, 281
Mustard, 213
— Paper, 214
— Poultice, 214
Mydriatics, 468
Myositics, 468

Myricil Alcohol, 419
Myricin, 419
Myristic Acid, 353
Myristica, 352
Myristicaceæ, 352
Myristicæ Oleum, 352
— — Expressum, 352
Myronic Acid, 213
Myrosine, 213
Myrrh, 240
Myrrha, 240
Myrtaceæ, 265

NARCEINE, 199, 206
Narcotics, 443
Narcotine, 199, 207, 343
Natrium, 136
Nectandræ Cortex, 357
Nervine Tonics, 446
Nicotianin, 343
Nicotine, 343
Nitrate of Ammonium, 52
— of Copper, 80
— of Lead, 120
— of Mercury, Acid Solution of, 106
— of Pilocarpine, 235
— of Potassium, 129
— of Silver, 60
— of Silver and Potassium, 60, 130
— of Sodium, 141
Nitre, 129
Nitric Acid, 40
— — Dilute, 40
Nitrite of Amyl, 168
Nitrogen, 14
Nitroglycerinum, 169
Nitro-hydrochloric Acid, Dilute, 40
Nitrous Ether, 160
— Oxide Gas, 173
Nutmeg, 352
— Expressed Oil of, 352
— Volatile Oil of, 352
Nux Vomica, 320

OAK BARK, 368
Oil of Cade, 383
— of Male Fern, 405
— of Neroli, 220
— of Spike, 347
— of Vitriol, 43
Ointments, 11
Oleaceæ, 314
Oleate of Mercury, 104, 317
— of Potassium, 315
— of Sodium, 314
— of Zinc, 317
Oleatum Hydrargyri, 317
— Zinci, 317
Oleic Acid, 316
Olein, 314, 415
Oleo-Resina Cubebæ, 364
Oleum Amygdalæ, 261
— Anethi, 280
— Anisi, 189, 278
— Anthemidis, 306
— Cadinum, 383
— Cajuputi, 266
— Carui, 280
— Caryophylli, 265
— Cinnamomi, 354
— Copaibæ, 255
— Coriandri, 279
— Crotonis, 361
— Cubebæ, 364
— Eucalypti, 267
— Juniperi, 382
— Lavandulæ, 347
— Limonis, 221
— Lini, 217
— Menthæ Piperitæ, 348
— — Viridis, 349
— Morrhuæ, 414
— Myristicæ, 352
— — Expressum, 352
— Olivæ, 314
— Phosphoratum, 19
— Pimentæ, 266
— Pini Sylvestris, 381
— Ricini, 362
— Rosmarini, 346
— Rutæ, 232
— Sabinæ, 384
— Santali, 363
— — Flavi, 363
— Sassafras, 357
— Sinapis, 213
— Terebinthinæ, 377
— Theobromatis, 224
Olive Oil, 314
Opianine, 199
Opianyl, 199, 207
Opium, 193
Opodeldoc, 315
Orange-flower Water, 220
— Peel, bitter, 220
— Wine, 156
Organic Substances, 182

Ovi Albumen, 413
— Vitellus, 414
Oxalate of Ammonium, 481
— of Cerium, 78
Oxalic Acid of Commerce, 481
Ox Bile, purified, 409
Oxide of Antimony, 58
— of Bismuth, 68
— of Lead, 116
— of Magnesium, 110
— of Manganese (Black), 115
— of Mercury (Red), 105
— — (Yellow), 104
— of Silver, 61
— of Zinc, 148
Oxygen, 14
Oxymel, 30, 418
— Scillæ, 390
Ozone, 14

PACHYDERMATA, 412
Palmitate of Cetyl, 412
— of Potassium, 314
— of Sodium, 314
Palmitic Acid, 413, 419
Palmitin, 314
Papaver Rhœas, 212
Papaveraceæ, 192
Papaverine, 198, 206
Papaveris Capsulæ, 192
Papilionaceæ, 242
Paraffin, 181
— Wax, 181
Paraffinum Durum, 181
— Solid, 181
— Molle, 181
Paramorphine, 199
Pararhodeoretin, 330
Paregoric Elixir, 202
Pareira Root, 190
Pareiræ Radix, 190
Pearl Barley, 401
Pectin, 369
Pelletierine, 269
Pellitory Root, 303
Pelosine, 190
Pepper, Black, 363
Peppermint, 348
— Camphor, 348
— Oil of, 348
Pepsin, 410
Perchloride of Iron, 90
— of Mercury, 101
— of Mercury, Solution of, 102
Permanganate of Potassium, 131
Pernitrate of Iron, 91
Peroxide of Hydrogen, 15
— of Iron, Hydrated, 89
Persulphate of Iron, 91
— of Mercury, 107
Peru Balsam, 246
Petrolatum, 181
Petroleine, 181
Petroleum Ether, 481
— Spirit, 481
Phaoretin, 351
Phenic Acid, 176
Phenol, 176
Phenol-Phthalein, 482
Phosphate of Ammonium, 52
— of Calcium, 77
— of Iron, 88
— of Sodium, 141
Phosphoric Acid, Concentrated, 41
— — Dilute, 42
Phosphorated Oil, 19
Phosphorus, 19
— Pill, 20
Physostigmina, 248
Physostigmine, 248
Physostigmatis semen, 248
Picrotoxine, 192
Pilocarpi Foliola, 235
Pilocarpinæ Nitras, 235
Pilocarpine, 235
Pilula Aloes Barbadensis, 392
— — Socotrinæ, 393
— — et Asafœtidæ, 275, 393
— — et Ferri, 392
— — et Myrrhæ, 241, 393
— Asafœtidæ Composita, 275
— Cambogiæ Composita, 229
— Colocynthidis Composita, 270
— Colocynthidis et Hyoscyami, 270
— Conii Composita, 273
— Ferri Carbonatis, 84
— — Iodidi, 85
— Galbani Composita, 275
— Hydrargyri, 95
— — Subchloridi Composita, 100
— Ipecacuanhæ cum Scilla, 201, 297, 390
— Opii, 315
— Phosphori, 20

Pilula Plumbi cum Opio, 117, 201
— Rhei Composita, 351
— Saponis Composita, 201, 315
— Scammonii Composita, 329
— Scillæ Composita, 390
Pimaric Acid, 378
Pimenta, 266
Pimentæ Oleum, 266
Pimento, 266
Pinaceæ, 377
Piperaceæ, 363
Piper Nigrum, 363
Piperin, 364
Pisces, 414
Pitch, Burgundy, 381
Pix Burgundica, 381
— Liquida, 382
Platinum Foil, 482
Plumbi Acetas, 117
— Carbonas, 119
— Iodidum, 116
— Nitras, 120
— Oxidum, 116
— Subacetatis Liquor, 118
Plumbum, 116
Pod Pepper, 331
Podophylli Rhizoma, 186
— Resina, 186
Podophylline, 186
Podophyllum, 186
Polychromic Acid, 392
Polycroite, 387
Polygalaceæ, 215
Polygalic Acid, 215
Polygonaceæ, 350
Pomegranate Root Bark, 268
Poppy Capsules, 192
Porphyroxine, 199
Posological Table, 504
Potash, Solution of, 121
— Water, 125
Potassa, 123
— Caustica, 123
— Sulphurata, 135
Potassæ Bitartras, 128
— Liquor, 121
Potassii Acetas, 125
— Bicarbonas, 124
— Bichromas, 135
— Bromidum, 134
— Carbonas, 123
— Chloras, 130
— Citras, 126
— Cyanidum, 135
— Ferrocyanidum, 135
Potassii Hydras, 123
— Iodidum, 132
— Nitras, 129
— Permanganas, 131
— Sulphas, 128
— Sulphurata, 135
— Tartras, 127
— — Acida, 128
Potassium, 120
Poultices, 5
Precipitated Carbonate of Lime, 73
— Sulphur, 17
Prepared Chalk, 74
Prescribing, Incompatibility in, 429
Proof Spirit, 153
Propylamin, 417
Prunum, 263
Prussic Acid, 36
Pseudojervine, 395
Pseudomorphine, 198
Pterocarpi Lignum, 245
Pulmonary Sedatives, 461
Pulvis Amygdalæ Compositus, 262
— Antimonialis, 58
— Catechu Compositus, 300
— Cinnamomi Compositus, 354
— Cretæ Aromaticus, 74
— — cum Opio, 202
— Elaterini Compositus, 271
— Glycyrrhizæ Compositus, 242
— Ipecacuanhæ Compositus, 202, 297
— Jalapæ Compositus, 331
— Kino Compositus, 202, 246
— Opii Compositus, 202
— Rhei Compositus, 351
— Scammonii Compositus. 329
— Tragacanthæ Compositus, 243
Pupil Contractors, 468
— Dilators, 468
Purgatives, 453
Pustulants, 469
Pyrethri Radix, 303
Pyrethric Acid, 303
Pyrethrin, 303
Pyrogallic Acid, 372
Pyroligneous Acid, 382
Pyroxylin, 219

QUASSIA WOOD, 237

Quassiæ Lignum, 237
Quassine, 237
Quercûs Cortex, 368
Quicksilver, 95
Quinic Acid, 284
Quinicine, 286
Quinidine, 285
Quininæ Hydrochloras, 283, 287
— Sulphas, 283, 287
Quinine, 285
Quinoidine, 286
Quinone, 284
Quino-tannic Acid, 284
Quinovic Acid, 285
Quinovin, 284

RAISINS, 230
Ranunculaceæ, 182
Rectified Spirit, 153
Red Iodide of Mercury, 103
Red Oxide of Mercury, 105
Red Poppy Petals, 212
Red Prussiate of Potash, 480
Reduced Iron, 83
— Iron Lozenges, 83
Refrigerants, 440
Remijia Bark, 283
Resin, 377
— of Guaiacum, 231
— of Jalap, 330
— of Podophyllum, 186
— of Scammony, 328
Resinæ, 377
Rhæadine, 198
Rhæagenine, 195
Rhamnaceæ, 238
Rhamni Frangulæ Cortex, 238
— Purshiani Cortex, 238
Rhatany Root, 216
Rhei Radix, 350
Rhodeoretin, 330
Rhœados Petala, 212
Rhubarb Root, 350
Rhus Toxicodendron, 240
Ricini Oleum, 362
Ricinic Acid, 362
Ricin-oleic Acid, 362
Ricin-stearic Acid, 362
Rochelle Salt, 146
Rosaceæ, 259
Rosæ Caninæ Fructus, 261
— Centifoliæ Petala, 259
— Gallicæ Petala, 260
Rose Petals, Cabbage, 259
— — Red, 260
Rose Water, 259
Rosemary, Oil of, 346
Rosin, 377
Rubefacients, 469
Rubijervine, 395
Rubinic Acid, 299
Rue, 232
Ruminantia, 407
Ruta, 232
Rutaceæ, 232
Rutæ Oleum, 232

SABADILLA, 395
Sabadilline, 396
Sabinæ Cacumina, 383
— Oleum, 383
Saccharated Carbonate of Iron, 84
— Solution of Lime, 73
Saccharum Lactis, 408
— Purificatum, 403
Sacred Bark, 238
Saffron, 386
St. Ignatius's Bean, 323
Salad Oil, 314
Sal Ammoniac, 49
— Volatile, 48
Salicaceæ, 366
Salicin, 366
Salicinum, 366
Salicylate of Sodium, 180, 366
Salicyl Hydride, 366
Salicylic Acid, 179, 366
Salicylol or Salicylous Acid, 352
Saligenin, 366
Saline Aperient Waters, 478
Sambuci Flores, 282
Sandal Wood, Red, 245
— — Oil, 363
Santalaceæ, 363
Santalin, 245
Santonica, 304
Santonin, 304
Santoninum, 304
Sapindaceæ, 224
Sapo Animalis, 314
— Durus, 314
— Mollis, 136, 314
Saponin, 215
Sapotaceæ, 311
Sarsæ Radix, 387
Sarsaparilla, 387
Sassafras, 356
— Radix, 356
Sassafrin, 356
Savin Tops and Oil, 383

Scammoniæ Radix, 328
— Resina, 328
Scammonium, 328
Scammony Resin and Root, 328
Scilla, 390
Scillitoxin, 390
Scoparii Cacumina, 244
Scoparine, 244
Scrophulariaceæ, 344
Sedatives, External or Local, 470
— Pulmonary, 461
— Spinal, 445
— Stomachic, 458
— Vascular, 448
Senegæ Radix, 215
Senegin, 215
Senna Alexandrina, 252
— Indica, 252
Serpentariæ Rhizoma, 358
Serpentary Rhizome, 358
Sevum Præparatum, 407
Sherry, 155
Sialagogues, 450
Silver, 59
Simarubaceæ, 237
Sinapis, 213
— Albæ Semina, 213
— Nigræ Semina, 213
Smilaceæ, 387
Smilacin, 389
Soap, 314
Socotrine Aloes, 391
Soda Caustica, 137
— Tartarata, 146
Sodæ Chlorinatæ Liquor, 144
— Liquor, 137
Sodii Arsenias, 65
— Bicarbonas, 139
— Bromidum, 145
— Carbonas, 138
— — Exsiccata, 138
— Chloridum, 145
— Citro-Tartras Effervescens, 146
— Ethylatis Liquor, 147
— Hypophosphis, 142
— Hyposulphis, 141
— Iodidum, 145
— Nitras, 141
— Phosphas, 141
— Salicylas, 180
— Sulphas, 140
— Sulphis, 140
— Sulphocarbolas, 178
— Valerianas, 302
Sodium, 136
Soft Paraffin, 181
— Soap, 314
Solanaceæ, 331
Solenostemma Argel, 253, 326
Solid Paraffin, 181
Solution of Acetate of Copper, 484
— — of Potassium, 484
— — of Sodium, 485
— of Albumen, 485
— of Ammonio-nitrate of Silver, 485
— of Ammonio-sulphate of Copper, 486
— of Ammonio-sulphate of Magnesium, 486
— of Boric Acid, 487
— of Bromine, 487
— of Carbonate of Ammonium, 487
— of Chloride of Ammonium, 487
— — of Barium, 488
— of Ferricyanide of Potassium, 488, 503
— of Ferrocyanide of Potassium, 488
— of Iodide of Potassium, 489
— of Isinglass, 489
— of Litmus, 489, 503
— of Oxalate of Ammonium, 489
— of Perchloride of Gold, 490
— of Perchloride of Platinum, 490
— of Phosphate of Sodium, 491
— of Potassio - Mercuric Iodide, 491
— of Stannous Chloride, 491
— of Sulphate of Indigo, 492
— of Sulphate of Iron, 492
— of Sulphate of Calcium, 492
— of Sulphydrate of Ammonium, 493
— of Tartaric Acid, 493
— of Tincture of Phenol-Phthalein, 494, 503
— of Yellow Chromate of Potassium, 494, 503

Solution (Volumetric) of Bichromate of Potash, 496
— (Volumetric) of Hyposulphite of Sodium, 498
— (Volumetric) of Iodine, 499
— (Volumetric) of Nitrate of Silver, 500
— (Volumetric) of Oxalic Acid, 501
— (Volumetric) of Soda, 502
Solutions, 8
Soporifics, 443
Spanish Fly, 420
Sparteine, 244
Spearmint Oil, 349
Spermaceti, 413
Sphacelinic Acid, 402
Spinal Sedatives, 445
— Stimulants, 444
Spiræa Ulmaria, 366
Spirit (Sweet) of Nitre, 160
— of Turpentine, 377
Spiritus, 9
— Ætheris, 158
— — Compositus, 158
— — Nitrosi, 160
— Ammoniæ Aromaticus, 48
— — Fœtidus, 275
— Armoraciæ Compositus, 215
— Cajuputi, 266
— Camphoræ, 355
— Chloroformi, 162
— Cinnamomi, 354
— Juniperi, 383
— Lavandulæ, 347
— Menthæ Piperitæ, 348
— Myristicæ, 353
— Rectificatus, 153
— Rosmarini, 347
— Tenuior, 153
— Vini Gallici, 154
Spongia Usta, 425
Spongida, 425
Squill, 390
Squirting Cucumber Fruit, 270
Stannum, 147
Staphisagriæ Semina, 187
Staphisagrine, 187
Star Anise Fruit, 189
Starch, 399
Stavesacre Seeds, 187
Stearin, 408
Sternutatories, 459
Stimulants, Spinal, 444
— Stomachic, 458
— Vascular, 448
Stomachic Sedatives, 458
— Stimulants, 458
— Tonics, 457
Storax, 367
— Solid, 368
Stramonii Semina, 340
Stramonium Seeds, 340
Strychnic Acid, 320
Strychnina, 320
Strychnine, 320
Styptics, 471
Styracaceæ, 312
Styracin, 247, 368
Styrax Calamita, 368
— Præparatus, 367
Styrol, 368
Styrone, 368
Subacetate of Copper, 80
— — of Commerce, 482
— of Lead, solution of, 118
Subchloride of Mercury, 100
Subcutaneous Injection, 433
Sublimed Sulphur, 17
Subnitrate of Bismuth, 68
Succi, 9
Succus Belladonnæ, 333
— Conii, 273
— Hyoscyami, 342
— Limonis, 221
— Mori, 373
— Scoparii, 244
— Taraxaci, 307
Sudorifics, 461
Suet, Prepared, 407
Sugar, Barley, 404
— Candy, 404
— of Lead, 117
— of Milk, 408
— Refined, 403
Sulphate of Atropine, 334
— of Beberine, 357
— of Cadmium, 72
— of Calcium, 76
— of Cinchonine, 283, 287
— of Cinchonidine, 283, 287
— of Copper, 79
— — Anhydrous, 482
— of Indigo, Solution of 259
— of Iron, 86
— of Iron, Dried, 86

Sulphate of Magnesium, 114
— of Morphine, 193
— of Potassium, 128
— of Quinidine, 288
— of Quinine, 283, 287
— of Sodium, 140
— of Zinc, 150
Sulphide of Allyl, 275
— of Iron, 482
— of Mercury, 106
Sulphindigotic Acid, 259
Sulphite of Sodium, 140
Sulpho-carbolate of Sodium, 178
— of Zinc, 178
Sulpho-sinapisin, 213
Sulphur, 17
— Lotum, 19
— Præcipitatum, 17
— Sublimatum, 17
Sulphurated Antimony, 55
— Lime, 76
— Potash, 135
Sulphuretted Hydrogen, 482
— Waters, 476
Sulphuric Acid, 43
— — Dilute, 43
Sulphuris Iodidum, 23
Sulphurous Acid, 44
Sulphur Waters, 476
Sulphydrate of Ammonium, 52
Sumbul Radix or Root, 281
Sumbulic Acid, 281
Suppositoria, 10
— Acidi Carbolici cum Sapone, 177
— Acidi Tannici, 371
— — cum Sapone, 371
— Hydrargyri, 96
— Iodoformi, 166
— Morphinæ, 203
— Morphinæ cum Sapone, 203
— Plumbi Composita, 117, 202
Swamp Hellebore, 394
Sweet Spirits of Nitre, 160
Symbols and Equivalent Weights, 13
Syrupi, 10
Syrupus, 404
— Aurantii, 220
— — Floris, 221
— Chloral, 170
— Ferri Iodidi, 85
— — Phosphatis, 88
Syrupus Hemidesmi, 325
— Limonis, 222
— Mori, 373
— Papaveris, 193
— Rhei, 351
— Rhœados, 212
— Rosæ Gallicæ, 260
— Scillæ, 390
— Sennæ, 254
— Tolutanus, 247
— Zingiberis, 385

TABACI FOLIA, 343
Tabellæ Nitroglycerini, 169
Table of Strength of Important Medicines, 518
Tamarind, 255
Tamarindus, 255
Tannic Acid, 369
Tannin, 217
Tar, 382
Taraxaci Radix, 306
Taraxacin, 307
Taraxacum, 307
Tartar Emetic, 56
Tartarated Antimony, 56
— Iron, 93
— Soda, 146
Tartaric Acid, 45
Tartrate of Iron and Potash, 93
— of Potassium, 127
— of Potassium, Acid, 128
— of Sodium and Potassium, 146
Taurocholate of Sodium, 410
Taurocholic Acid, 410
Tea, 226
Tephrosia Apollinea, 253
Terebinthina Canadensis, 379
— Veneta, 380
Terebinthinæ Oleum, 377
Test-Solutions, 484
Tetrachloride of Carbon, 167
Tetramethyl-Ammonium, Iodide of, 417
Thalamifloræ, 182
Thallogenæ, 406
Thea, 226
Thebaïne, 199, 205
Theine, 226
Theobolactic Acid, 195
Theobroma Oil, 224
Theobromine, 227
Therapeutics, 426

Theriaca, 404
Thiosulphate of Sodium, 141, 481
Thorn Apple, 340
Thus Americanum, 380
Thymelaceæ, 359
Thymol, 349
Tin, 147
— Granulated, 147, 483
Tinctura Aconiti, 184
— Aloes, 393
— Arnicæ, 309
— Asafœtidæ, 276
— Aurantii, 220
— — Recentis, 221
— Belladonnæ, 333
— Benzoini Composita, 313
— Buchu, 233
— Calumbæ, 190
— Camphoræ Composita, 202, 355
— Cannabis Indicæ, 374
— Cantharidis, 422
— Capsici, 332
— Cardamomi Composita, 386
— Cascarillæ, 360
— Catechu, 300
— Chiratæ, 327
— Chloroformi Composita, 162
— Chloroformi et Morphinæ, 162, 203
— Cimicifugæ, 188
— Cinchonæ, 289
— — Composita, 289
— Cinnamomi, 354
— Cocci, 420
— Colchici Seminum, 398
— Conii, 273
— Croci, 387
— Cubebæ, 365
— Digitalis, 344
— Ergotæ, 402
— Ferri Acetatis, 94
— — Perchloridi, 91
— Gallæ, 371
— Gelsemii, 324
— Gentianæ Composita, 327
— Guaiaci Ammoniata, 232
— Hyoscyami, 342
— Iodi, 21
— Jaborandi, 235
— Jalapæ, 331
— Kino, 246
— Krameriæ, 217
— Laricis, 380
Tinctura Lavandulæ Composita, 347
— Limonis, 222
— Lobeliæ, 310
— — Ætherea, 310
— Lupuli, 376
— Myrrhæ, 241
— Nucis Vomicæ, 321
— Opii, 202
— — Ammoniata, 202
— Podophylli, 187
— Pyrethri, 303
— Quassiæ, 237
— Quininæ, 289
— — Ammoniata, 289
— Rhei, 351
— Sabinæ, 384
— Scillæ, 390
— Senegæ, 216
— Sennæ, 254
— Serpentariæ, 359
— Stramonii, 341
— Sumbul, 281
— Tolutana, 247
— Valerianæ, 301
— — Ammoniata, 301
— Veratri Viridis, 395
— Zingiberis, 385
— — Fortior, 385
Tincturæ, 10
Tobacco, 343
Tolu Balsam, 247
Toluene, 382
Tonics, Blood, 436
— Nervine, 446
— Stomachic, 457
— Vascular, 449
Tragacantha, 243
Treacle, 404
Trimethylamin, 417
Trochisci, 11
— Acidi Benzoici, 313
— — Tannici, 371
— Bismuthi, 69
— Catechu, 300
— Ferri Redacti, 83
— Ipecacuanhæ, 297
— Morphinæ, 203
— — et Ipecacuanhæ, 203
— Opii, 202
— Potassii Chloratis, 130
— Santonini, 305
— Sodii Bicarbonatis, 139
Turmeric, 483

Turmeric Paper, 483
— Tincture, 483
Turpentine, 377
— Oil of, 377
— Spirits of, 377
— Venice, 380

UMBELLIFERÆ, 272
Umbelliferone, 276
Unguenta, 11
Unguentum Acidi Borici, 32
— — Carbolici, 177
— — Salicylici, 179
— Aconitinæ, 184
— Antimonii Tartarati, 57
— Atropinæ, 334
— Belladonnæ, 334
— Cadmii Iodidi, 71
— Calaminæ, 148
— Cantharidis, 422
— Cetacei, 413
— Chrysarobini, 251
— Citrinum, 106
— Cocculi, 192
— Creasoti, 175
— Elemi, 242
— Eucalypti, 268
— Gallæ, 371
— — cum Opio, 202, 371
— Glycerini Plumbi Subacetatis, 119
— Hydrargyri, 96
— — Ammoniati, 103
— — Compositum, 96
— — Iodidi Rubri, 104
— — Nitratis, 106
— — — Dilutum, 106
— — Oxidi Rubri, 105
— — Subchloridi, 100
— Iodi, 21
— Iodoformi, 166
— Paraffinum, 181
— Picis Liquidæ, 382
— Plumbi Acetatis, 118
— — Carbonatis, 120
— — Iodidi, 117
Unguentum Plumbi Subacetatis Compositum, 119
— Potassæ Sulphuratæ, 136
— Potassii Iodidi, 133
— Præcipitati Albi, 103
— Resinæ, 378
— Sabinæ, 384
— Simplex, 413, 419
— Staphisagriæ, 188
— Sulphuris, 18
— — Iodidi, 23
— Terebinthinæ, 378
— Veratrinæ, 396
— Zinci, 149
— — Oleati, 317
Uvæ, 230
— Ursi Folia, 310

VALERIANACEÆ, 300
Valerianæ Rhizoma, 300
Valerianate of Ammonium, 303
— of Iron, 303
— of Quinine, 288, 303
— of Sodium, 302
— of Zinc, 302
Valerianic Acid, 300, 376
Valerole, 301, 376
Vapor Acidi Hydrocyanici, 37
— Chlori, 27, 76
— Coninæ, 273
— Creasoti, 175
— Iodi, 21
— Olei Pini Sylvestris, 381
Vapores, 11
Vascular Sedatives, 448
— Stimulants, 448
— Tonics, 449
Vegetables, Directions for Collection of, 182
Venice Turpentine, 380
Veratralbine, 395
Veratri Viridis Rhizoma, 394
Veratrina, 396
Veratrine, 395, 396
Veratroidine, 395
Veratrum Viride, 395
Verbascum Thapsus, 346
Verdigris, 80, 482
Vesicants, 469
Vina, 11
Vinegar, 31
Vinum Aloes, 393
— Antimoniale, 57

Vinum Aurantii, 156
— Colchici, 398
— Ferri, 81
— — Citratis, 92
— Ipecacuanhæ, 297
— Opii, 202
— Quininæ, 289
— Rhei, 351
— Xericum, 155
Vitaceæ, 230
Vitellin, 414
Vitriol, White, 150
Volumetric Solutions, 495

WARD'S PASTE, 364
Warm Plaster, 421
Water, 28
Waters, 475
— Acidulous, 478
— Alkaline, 477
— Carbonated, 478
— Chalybeate, 475
— Ferruginous, 475
— Hepatic, 476
— Mineral, 475
— Saline, 478
— Sulphuretted, 476
— Thermal Indifferent, 478
Wax, White and Yellow, 418
Weights and Measures, 1
White Arsenic, 62
White Bismuth, 68
— Marble, 74
— Precipitate of Mercury, 102
— Vitriol, 150
Whortleberry, 310
Wines, 11
Wurrus, 362

XYLENE, 382

YEAST, 156
— Poultice, 156
Yellow Jasmine, 324
— Oxide of Mercury, 104
— Prussiate of Potash, 135
Yolk of Egg, 414

ZINC, 148
Zinci Acetas, 152
— Carbonas, 151
— Chloridum, 149
— Oxidum, 148
— Sulphas, 150
— Sulphocarbolas, 178
— Valerianas, 302
Zincum, 148
Zingiber, 384
Zingiberaceæ, 384
Zygophyllaceæ, 231

THE END.

BRADBURY, AGNEW, & CO., PRINTERS, WHITEFRIARS.

By the same Author, price 21*s.*

A TREATISE ON GOUT AND RHEUMATIC GOUT

(RHEUMATOID ARTHRITIS).

The Third Edition, thoroughly revised and enlarged: with 6 Plates, comprising 21 Figures (14 Coloured), and 27 Illustrations engraved on Wood.